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RESEARCH MEMORANDUM

EFFECTIVENESS AT TRANSONIC SPEEDS OF FLAP-TYPE AILERONS FOR SEVERAL SPANWISE LOCATIONS ON A 4-PERCENT-THICK SWEPTBACK-WING—FUSELAGE MODEL WITH AND WITHOUT TAILS

By Gerald Hieser and Charles F. Whitcomb

Langley Aeronautical Laboratory
Langley Field, Va.

NATIONAL ADVISORY COMMITTEE
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ERRATA

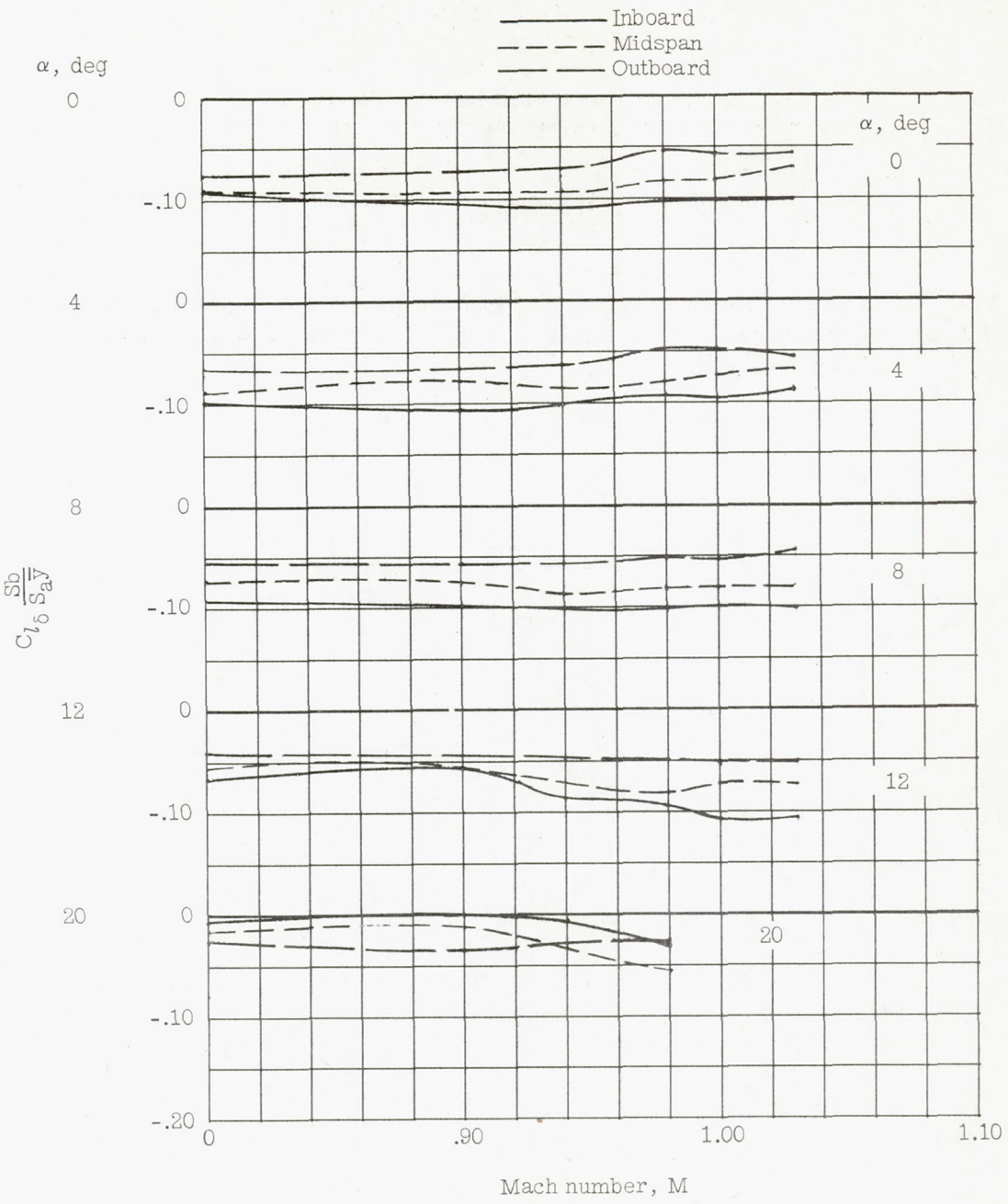
NACA Research Memorandum L56J04

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Page 31: Replace figure 8(a) with corrected figure 8(a) attached, since a constant of conversion was inadvertently omitted in computing the data of the original plot.

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(a) $C_{l_\delta} \frac{Sb}{S_a \bar{y}}$.

Figure 8.- Effect of Mach number on the parameters $C_{l_\delta} \frac{Sb}{S_a \bar{y}}$ and $C_{L_\delta} \frac{S}{S_a}$. Ailerons on right wing; tail off.

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ERRATA NO. 2

NACA Research Memorandum L56J04

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Page 34: The attached corrected figure 10 should be used to replace the original plot which was found to have the vertical scale of rolling-moment coefficient C_l at $M = 0.80$ displaced by an increment of 0.01.

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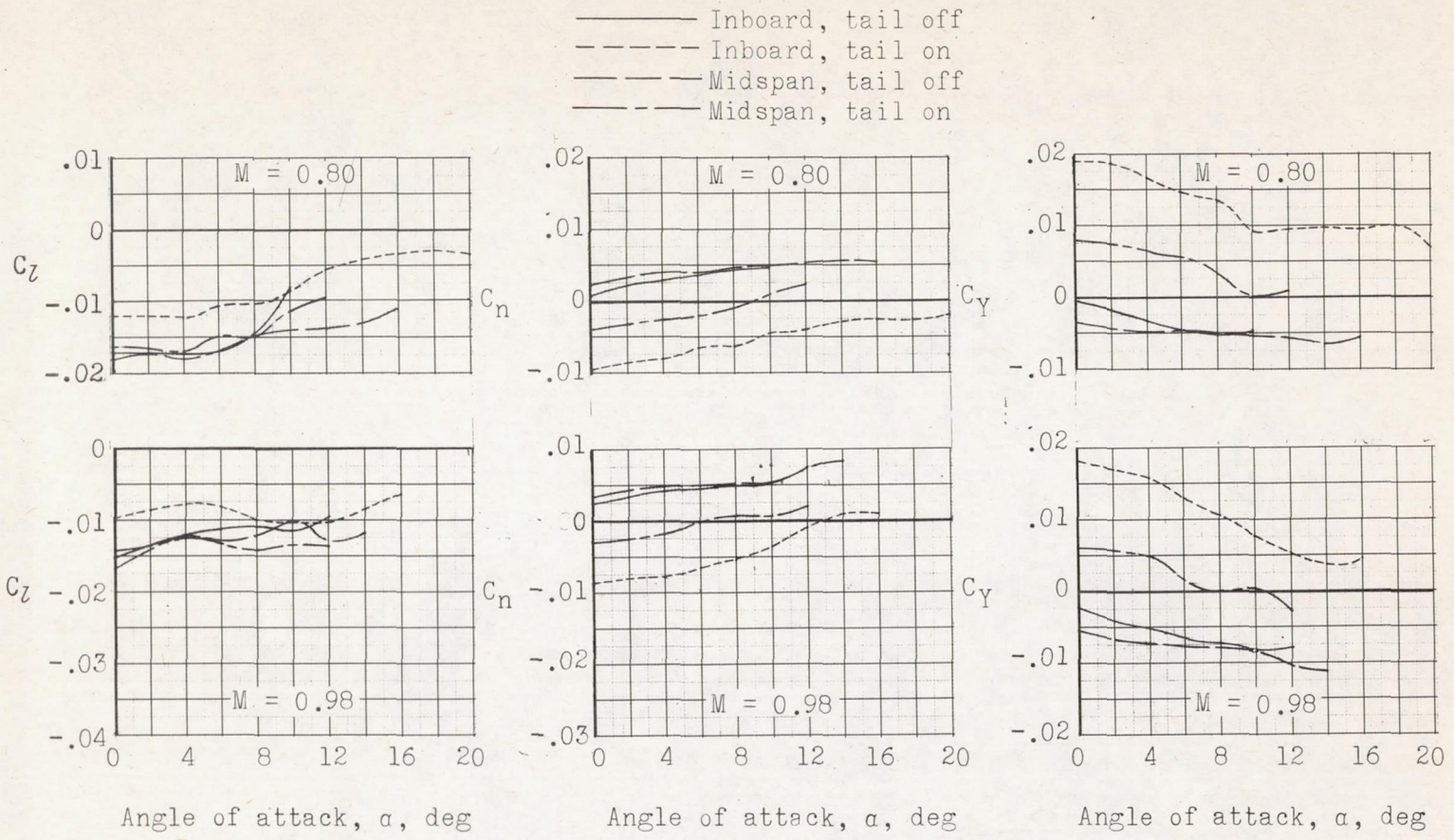


Figure 10.- Effect of tail on model lateral characteristics. Inboard and midspan ailerons on right wing; $\delta_N = 15^\circ$.

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SUMMARY

A transonic investigation has been made in the Langley 16-foot transonic tunnel to determine the effects of spanwise location of a flap-type aileron on the lateral characteristics of a 4-percent-thick sweptback-wing—fuselage model. Some effects of the model tail on the lateral characteristics are also included. The inboard, midspan, and outboard ailerons have a span of 40 percent of the wing semispan and a chord of 30 percent of the wing chord. The tests covered Mach numbers from 0.80 to 1.03 and angles of attack up to 27°.

For the model with no tail, the outboard aileron effectiveness was the lowest at angles of attack up to 12° while the inboard and midspan ailerons had about equal effectiveness. The effects of the empennage on the model lateral characteristics with the inboard aileron deflected were generally greater than the effects on the characteristics with the midspan aileron deflected. With the inboard ailerons differentially deflected 15°, addition of the empennage caused a reduction in the rolling moment at low angles of attack and at all Mach numbers. The largest reduction amounted to about 30 percent of the rolling momemt for the model with no tail.

INTRODUCTION

Experimental research at transonic speeds to determine lateral control characteristics of flap-type ailerons is needed because the available data are meager and theory is inadequate for accurate prediction of control effectiveness. Most existing information has been obtained from tests of small-scale models by utilizing the transonic-bump and wing-flow

techniques. (See, for example, refs. 1 to 3.) Accordingly, effectiveness and loading characteristics of flap-type controls on relatively large-scale unswept, sweptback, and delta wings are being investigated in the Langley 16-foot transonic tunnel at Mach numbers up to and slightly above 1.0. Results from an unswept-wing model investigation are reported in reference 4. The present paper includes effectiveness information obtained from tests of a 45° sweptback-wing model with inboard, midspan, and outboard ailerons. In addition, the effects of a horizontal tail, a vertical tail, and the complete empennage on the lateral characteristics are included.

The sting-supported model used for the investigation has a 45° sweptback wing with an aspect ratio of 3, a taper ratio of 0.2, and NACA 65A004 airfoil sections streamwise. The longitudinal characteristics of this model without ailerons are presented in reference 5. For the present investigation the model was equipped with inboard, midspan, and outboard unbalanced ailerons, each having a span of 40 percent of the wing semispan and a chord of 30 percent of the wing chord. Data have been obtained at Mach numbers from 0.80 to 1.03, angles of attack up to 27°, and aileron deflections to approximately ±15°. The test Reynolds number was approximately 7×10^6.

SYMBOLS

The model forces and moments have been reduced to the stability system of axes.

b	wing span
c	local wing chord
c'	wing mean aerodynamic chord
C_L	lift coefficient, $\frac{\text{Lift}}{qS}$
C_l	Rolling-moment coefficient, $\frac{\text{Rolling moment}}{qSb}$
C_n	yawing-moment coefficient, $\frac{\text{Yawing moment}}{qSb}$
C_Y	lateral-force coefficient, $\frac{\text{Lateral force}}{qS}$
M	free-stream Mach number

q free-stream dynamic pressure

S wing area

α angle of attack of model (fuselage center line)

δ aileron deflection angle in plane normal to aileron hinge line (positive when trailing edge is down)

δ_N nominal aileron deflection (not corrected for deflection due to load)

Λ sweep angle

$$C_{l_\delta} = \left(\frac{\partial C_l}{\partial \delta}\right)_\alpha$$

$$C_{L_\delta} = \left(\frac{\partial C_L}{\partial \delta}\right)_\alpha$$

S_a aileron area

$\bar{y}$ moment arm of aileron; distance from aileron center of area to rolling-moment axis

MODEL AND APPARATUS

Model

The aluminum-alloy wing, which has 45° sweep of the quarter-chord line, was mounted on the body in a midwing position and was designed for no geometric twist, incidence, or dihedral. The airfoil sections parallel to the plane of symmetry are NACA 65A004. Coordinates of this section are given in reference 5 and the fuselage ordinates are given in reference 6.

The unbalanced trailing-edge ailerons were composed of four segments on each wing and were deflected in adjacent pairs to simulate the inboard, midspan, and outboard configuration. Aileron deflection was accomplished by utilizing tongues mounted between the wing and ailerons at the hinge line. These tongues were bent to obtain nominal deflections of 0°, ±7.5°, and ±15° perpendicular to the hinge line. On the left wing the tongue for each segment covered its full span so that no gap existed between the wing and aileron. On the right wing, however, two separate tongues 0.86 inch in width spanwise were utilized to attach each of the four

aileron segments. A gap of about 0.4 percent of the wing chord, therefore, existed over 71 percent of the aileron span.

The horizontal tail has a sweep angle of 45° of the quarter-chord line and was mounted on the model in the wing chord plane extended at an incidence of -4°. The vertical tail also has 45° sweepback of the quarter-chord line.

Pertinent dimensions and geometric details of the model are given in figure 1 and photographs of the model are given as figure 2.

Apparatus

The tests were conducted in the Langley 16-foot transonic tunnel, which is an atmospheric wind tunnel with an octagonal slotted test section permitting a continuous variation in speed to Mach numbers slightly above 1.0. (See ref. 7.) The sting-support system is arranged so that the model is located near the center of the tunnel at all angles of attack.

Model forces and moments were measured by a six-component internal strain-gage balance, and angle of attack by a strain-gage attitude transmitter.

TESTS

Simultaneous measurements of model forces and moments were obtained for the following configurations:

Purpose	δ_N							
	Right-wing aileron			Left-wing aileron			Horizontal tail	Vertical tail
	Inboard	Midspan	Outboard	Inboard	Midspan	Outboard		
Spanwise effect	0	0	0	0	0	0	Off	Off
	7.5	0	0	0	0	0	Off	Off
	15	0	0	0	0	0	Off	Off
	-7.5	0	0	0	0	0	Off	Off
	-15	0	0	0	0	0	Off	Off
	0	7.5	0	0	0	0	Off	Off
	0	15	0	0	0	0	Off	Off
	0	-7.5	0	0	0	0	Off	Off
	0	-15	0	0	0	0	Off	Off
	0	0	7.5	0	0	0	Off	Off
	0	0	-7.5	0	0	0	Off	Off
	0	0	-15	0	0	0	Off	Off
Tail effect	-15	0	0	15	0	0	Off	Off
	-15	0	0	15	0	0	On	Off
	-15	0	0	15	0	0	Off	On
	-15	0	0	15	0	0	On	On
	15	0	0	0	0	0	On	On
	0	15	0	0	0	0	On	On

Tests of the model configurations given in the table were made at Mach numbers from 0.80 to 1.03. The angle of attack varied from -3.6° to a maximum of 27.4° at the lower loading conditions, and from 0° to 10.6° at the highest loadings.

The Reynolds number based on wing mean aerodynamic chord varied from about 6.7×10^6 to 7.7×10^6.

ACCURACY

The measurement of Mach number in the test region is believed to be accurate within ± 0.005, and the angles of attack presented are estimated to be correct within $\pm 0.1^\circ$.

The aileron deflection angles were obtained from the nominal angle and a deflection due to load. This deflection due to load was determined from a static calibration of applied load measured by strain gages mounted on the supporting tongues between the wing and ailerons. The resulting values of δ are believed to be accurate within $\pm 0.25^{\circ}$.

No adjustments to the measured forces and moments have been applied to account for sting interference or aeroelasticity. Elastic properties of the basic wing without ailerons obtained from static loadings are given in reference 8.

The accuracy of the model balance is believed to be within $\pm 1/2$ percent of the maximum forces and moments encountered.

RESULTS

A complete listing of the basic data from the aileron-spanwise-location investigation of the model without tails is presented in table I. The tabulation includes results from deflection of the ailerons at the three spanwise locations on the right wing only. Some sample plots of the lateral data taken from cross plots of the results listed in table I are presented in figures 3, 4, and 5.

DISCUSSION

Some sample curves showing effects of angle of attack on the rolling-moment coefficient of the model with no tail are shown in figure 6. Results for the model with the three different ailerons deflected to nominal angles of $\pm 7.5^{\circ}$ are presented for Mach numbers of 0.80 and 1.03. For negative aileron deflections, the rolling-moment coefficient generally increases with increasing model attitude up to an angle of attack of about 4° to 8°, above which some decreases in rolling-moment coefficient occur. Positive aileron deflections result in a decreasing rolling-moment coefficient as the angle of attack is increased to approximately 20°, after which a rapid increase occurs.

Effect of Aileron Spanwise Position on Roll and Lift Effectiveness

Effectiveness parameters.- Figure 7 presents the variation of the aileron roll-effectiveness parameter C_{l_δ} and the aileron lift-effectiveness parameter C_{L_δ} with Mach number for the three spanwise

locations of the ailerons on the model with no tail. The values of these parameters were obtained by slope measurements in the vicinity of zero aileron deflection from plots similar to figure 3. For angles of attack up to and including 12°, the outboard aileron, which has the least area, has less roll effectiveness than either the inboard or midspan ailerons which have essentially equal effectiveness (fig. 7(a)). Furthermore, the induced load due to aileron deflection on the portions of the wing not occupied by the aileron is probably smaller for the outboard configuration than for either the inboard or the midspan. This relative induced-loading characteristic is probably amplified by the fact that the wing is swept. Although the roll effectiveness of the inboard and midspan ailerons are about equal, the lift effectiveness of the inboard aileron is greater (see fig. 7(b)). It therefore follows that the center of load due to aileron deflection shifts farther from the roll axis for the midspan aileron.

At an angle of attack of 20°, the roll effectiveness of the inboard aileron is very small and, in fact, is zero over part of the Mach number range (fig. 7(a)). The midspan and outboard ailerons retain some effectiveness, the outboard aileron being the more effective at Mach numbers up to 0.93, after which the midspan aileron becomes more effective.

As in the case of the roll effectiveness, the outboard aileron has the least lift effectiveness at angles of attack up to at least 12° (figure 7(b)). The inboard aileron lift effectiveness, however, is greater than the midspan effectiveness at all Mach numbers. This sequence of lift effectiveness, increasing from outboard to inboard, results from the relative aileron areas and from the relative induced loading which increases as the aileron is moved inboard.

Normalized effectiveness parameters.- It is shown empirically in reference 9 that at supersonic speeds the lift effectiveness of an aileron can be related to its area and the roll effectiveness to the aileron moment of area about the roll axis. For the mixed-flow case of the transonic speed range this simple concept is not necessarily valid. However, normalizing the measured effectiveness parameters of C_{l_δ} and C_{L_δ} on the basis of their respective moments of area and areas for the three ailerons tested should present a relative picture of the performance of the three ailerons without regard to their geometry or location. Such normalized values for the three ailerons are presented in figure 8. For angles of attack through 12° both the normalized roll-effectiveness parameter $C_{l_\delta} \frac{Sb}{S_a \bar{y}}$ and the normalized lift-effectiveness parameter $C_{L_\delta} \frac{S}{S_a}$ are the greatest for the inboard aileron and the least for the outboard. That is, for a unit of aileron moment of area or a unit of aileron area, the inboard aileron position is the most effective and the outboard

position is the least effective. At an angle of attack of 20° the trends of the normalized roll effectiveness parameters for the three ailerons follow the same pattern as the parameter C_{l_δ}. The outboard aileron is somewhat more effective than the other two for Mach numbers up to about 0.92. This is also indicated by the normalized lift-effectiveness parameter at this angle.

Tail Effects

Previous investigations to determine the effectiveness of lateral controls on models include very little information which defines the effects of a tail or complete empennage on the model lateral characteristics, particularly in the transonic speed range. That is, the effects of changes in the tail loads which result from changes in the model downwash and sidewash caused by deflection of lateral controls have been largely neglected. Accordingly, the present investigation includes tests of the model with a horizontal tail, vertical tail, and complete empennage.

Inboard ailerons.- A vertical tail and a horizontal tail have been added separately and in combination to the model with the inboard ailerons differentially deflected 15° each on opposite wing panels. The lateral characteristics of these configurations are presented in figure 9. The results of the tails-off model tests indicate that the rolling-moment coefficient decreases rapidly above an angle of attack of approximately 4° at a Mach number of 0.80. This rapid decrease is delayed to an angle of attack of about 10° for the higher Mach numbers of 0.98 and 1.03. These trends are essentially the same for the three tail-on configurations tested. A reduction in rolling-moment coefficient over the angle-of-attack range up to approximately 8° or 10° occurred at all Mach numbers when either or both of the tails were added to the model. The largest of these reductions was about 30 percent and occurred when the combined tails were added. This latter result is in agreement with results from tests of a free-flying model with and without a free-to-roll tail, wherein the effects of tail damping are considered (ref. 10).

Observation of the decrements caused by the individual vertical and horizontal tails indicates that the horizontal tail contributes the greatest part of the reduction in rolling-moment coefficient (fig. 9). This reduction is probably due to changes in tail loading of opposite sign on the two tail panels which results from changes in wing downwash caused by the differentially deflected ailerons. At angles of attack above about 10°, addition of the vertical tail alone causes an increase in the rolling-moment coefficient, whereas at lower angles a decrease is noted. This change in sign of the rolling-moment increment results from the fact that the center of load on the vertical tail shifts from a position above the roll axis to a position below the axis as the angle of

attack is increased. The increments in side-force and yawing-moment coefficients due to the effect of sidewash on the vertical tail increase with increasing Mach number up to a Mach number of about 0.98.

Transonic tests of a body-mounted lateral-control device adapted to the present basic wing-fuselage configuration have been made and the results have been published in reference 11. Addition of the empennage to this configuration altered the magnitudes of the lateral coefficients by about the same percentages as for the present inboard aileron configuration.

Inboard and midspan ailerons.- A comparison of the model lateral characteristics obtained with the right-wing inboard and midspan ailerons individually deflected 15° and the empennage on and off is presented for Mach numbers of 0.80 and 0.98 in figure 10. Generally, the tail has a greater effect on the lateral characteristics of the inboard aileron configuration than on those of the midspan aileron configuration. Adding the tails reduced the rolling-moment coefficients of the inboard aileron model by about 0.0050 at angles of attack up to 6° but had essentially no effect on the midspan aileron model at these same low angles. The tail effects on the model yawing-moment and side-force coefficients were about twice as great for the inboard aileron configuration as for the midspan aileron over the angle-of-attack and Mach number ranges tested. The changes in the wing downwash and sidewash in the vicinity of the tail are therefore much greater for the inboard aileron deflections than for the midspan.

Effect of Spanwise Aileron Position on Complete Model Rolling-Moment Characteristics

In the discussion of the characteristics of the model with no tail, it was shown that the midspan and inboard ailerons have about the same effectiveness. It was also established that the downwash and sidewash effects on the empennage loads are more detrimental to the model rolling moment with the inboard ailerons deflected than with the midspan ailerons. As a result, the midspan ailerons are more effective on the complete model than the inboard ailerons. (See fig. 10.)

Because the present investigation did not include tests of the outboard aileron configuration with a tail on the model, insufficient information is available to obtain a direct comparison of the midspan and outboard aileron effectiveness for the complete model. An indication of the relative merits of these two configurations, however, can be gained by referring to the data of figures 6 and 10 and to results shown in reference 10. In figure 6 a comparison of the midspan and outboard ailerons for the model with no tail reveals that the midspan aileron generally

produces somewhat greater rolling-moment coefficients than the outboard aileron. Referring to the data of figure 10 at small angles of attack, it is shown that the effect of the empennage on the midspan aileron rolling moment is detrimental but small. Likewise, the data of reference 10 reveal that the empennage effect on the effectiveness of an outboard aileron is detrimental and small. Apparently, therefore, it might be expected that, for the complete model, the midspan aileron would be somewhat more effective than the outboard aileron. Since it has been established that the midspan aileron is more effective than the inboard aileron, it is reasoned that the midspan location should be the best for a complete configuration of this type.

CONCLUSIONS

A comparison of the transonic lateral characteristics of a 4-percent-thick 45° sweptback-wing—fuselage model equipped with 30-percent-chord flap-type ailerons located at three different spanwise positions has been made. The effects of a horizontal tail, a vertical tail, and the complete empennage are included.

1. For the model with the tail off, the outboard aileron effectiveness was the lowest of the three at angles of attack up to at least 12°, while the inboard and midspan ailerons had about equal effectiveness. When the effectiveness parameters were normalized to eliminate the effect of geometric characteristics, the inboard aileron had the greatest roll effectiveness and the outboard had the least.

2. With the inboard ailerons differentially deflected 15°, addition of the empennage caused a reduction in the model rolling-moment coefficient at angles of attack up to about 8° or 10° at all Mach numbers. The largest reduction amounted to about 30 percent of the rolling-moment coefficient for the model with no tail.

3. The effects of the empennage on the model lateral characteristics with the inboard aileron deflected were generally greater than the effects on the characteristics of the model with the midspan aileron deflected. Adding the empennage reduced the rolling-moment coefficient about 0.0050 at angles of attack up to about 6° with the inboard aileron deflected 15° on one wing, while essentially no change in rolling moment resulted from the presence of the empennage on the model at these angles of attack with the midspan aileron deflected.

Langley Aeronautical Laboratory,
National Advisory Committee for Aeronautics,
Langley Field, Va., September 18, 1956.

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TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING

[Tail off]

(a) Inboard aileron

M = 0.80						M = 0.90					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-0.04	-14.71	-.1369	.0001	.0154	.0001	-0.03	-14.54	-.1331	-.0007	.0150	.0011
1.97	-14.73	-.0177	.0017	.0160	-.0009	1.87	-14.59	-.0130	.0013	.0155	-.0000
3.98	-14.77	.1084	.0038	.0170	-.0021	3.77	-14.63	.1103	.0036	.0173	-.0011
5.99	-14.79	.2352	.0060	.0188	-.0035	5.70	-14.67	.2458	.0055	.0185	-.0023
8.01	-14.80	.3707	.0069	.0191	-.0043	7.61	-14.70	.3794	.0067	.0184	-.0033
10.01	-14.81	.4757	.0075	.0146	-.0047	9.52	-14.72	.4873	.0076	.0198	-.0041
12.93	-15.07	.6640	.0103	.0128	-.0066	11.42	-14.86	.5760	.0084	.0147	-.0050
13.98	-15.03	.6947	.0092	.0125	-.0070	13.03	-15.12	.6638	.0104	.0124	-.0056
17.10	-15.39	.8111	.0113	.0094	-.0080	15.14	-15.37	.7593	.0114	.0118	-.0065
19.05	-15.38	.8313	.0103	.0067	-.0068	17.24	-15.47	.8421	.0124	.0101	-.0077
21.05	-15.41	.8734	.0094	.0045	-.0070	19.26	-15.56	.8834	.0111	.0068	-.0062
24.98	-15.61	.9698	.0020	-.0120	.0052	21.22	-15.63	.9250	.0117	.0017	-.0050
						25.18	-15.82	1.0262	.0006	-.0106	.0024
-0.04	-7.39	-.0796	.0004	.0076	-.0005	-0.04	-7.33	-.0789	-.0010	.0086	-.0000
1.97	-7.42	.0444	.0010	.0077	-.0009	1.97	-7.32	.0476	.0004	.0093	-.0005
3.98	-7.44	.1669	.0027	.0094	-.0014	4.00	-7.41	.1821	.0023	.0106	-.0012
5.99	-7.45	.3003	.0037	.0096	-.0022	5.99	-7.44	.3243	.0033	.0102	-.0016
8.01	-7.46	.4415	.0042	.0105	-.0027	8.03	-7.45	.4732	.0047	.0111	-.0024
9.99	-7.47	.5301	.0047	.0072	-.0027	9.99	-7.46	.5785	.0048	.0096	-.0026
11.98	-7.57	.6447	.0052	.0069	-.0036	11.98	-7.66	.6571	.0058	.0079	-.0033
12.99	-7.74	.7031	.0057	.0061	-.0036	13.07	-7.85	.6969	.0065	.0061	-.0031
13.98	-7.67	.7360	.0060	.0058	-.0042	15.20	-8.01	.8063	.0078	.0061	-.0048
17.10	-7.96	.8408	.0064	.0045	-.0038	17.27	-8.10	.8737	.0079	.0047	-.0036
18.99	-7.96	.8603	.0062	.0031	-.0034	19.19	-8.16	.9195	.0071	.0018	-.0041
20.93	-7.97	.9020	.0054	.0011	-.0038	21.22	-8.23	.9648	.0074	-.0027	-.0022
24.89	-8.20	.7208	-.0036	-.0138	.0086	25.18	-8.24	1.0808	-.0032	-.0111	.0057
-3.65	0.05	-.2314	-.0006	-.0011	-.0006	-3.62	0.06	-.2422	-.0004	-.0016	-.0007
-1.56	0.02	-.1010	-.0005	-.0012	-.0004	-1.66	0.03	-.1170	-.0003	-.0014	-.0004
-0.58	0.00	-.0422	-.0001	-.0010	-.0003	-0.56	0.00	-.0452	-.0002	-.0012	-.0005
1.41	-.02	.0704	-.0002	-.0005	-.0004	1.43	-.02	.0783	.0000	-.0005	-.0003
2.43	-.03	.1334	.0001	-.0005	-.0002	2.41	-.03	.1427	.0002	-.0000	-.0002
4.47	-.06	.2678	.0001	.0007	-.0001	4.47	-.07	.2958	.0007	.0007	-.0001
6.44	-.08	.4029	.0003	.0010	.0001	6.40	-.09	.4365	.0005	.0017	-.0000
8.38	-.08	.5268	.0009	.0018	-.0004	8.44	-.11	.5668	.0010	.0027	-.0006
10.45	-.19	.6167	.0009	.0014	-.0007	10.49	-.13	.6353	.0009	.0012	-.0005
11.39	-.21	.6732	.0012	.0013	-.0006	11.48	-.34	.6780	.0014	.0014	-.0006
12.50	-.24	.7238	.0007	.0011	-.0006	12.53	-.39	.7226	.0012	.0010	-.0006
13.53	-.30	.7674	.0015	.0008	-.0007	13.64	-.45	.7841	.0017	.0012	-.0007
15.65	-.39	.8405	.0012	.0011	-.0013	15.77	-.55	.8707	.0020	.0013	-.0013
17.72	-.48	.8929	.0004	.0005	-.0012	17.89	-.66	.9373	.0004	.0001	-.0006
19.72	-.55	.8983	-.0006	.0003	-.0014	19.95	-.73	.9707	-.0015	-.0006	-.0002
21.79	-.61	.9456	-.0063	-.0021	.0010	22.01	-.82	1.0089	-.0052	-.0032	.0028
23.88	-.55	.9937	-.0166	-.0065	.0073	24.13	-.95	1.0715	-.0158	-.0084	.0087
						26.23	-.98	1.1238	-.0199	-.0113	.0121
-0.02	7.40	.0597	.0001	-.0096	-.0005	-0.08	7.35	.0665	-.0013	-.0105	-.0000
1.99	7.38	.1796	-.0004	-.0101	.0003	1.93	7.30	.1960	-.0020	-.0100	.0008
3.98	7.35	.3065	-.0012	-.0089	.0012	3.94	7.26	.3408	-.0028	-.0089	.0014
5.99	7.33	.4463	-.0013	-.0080	.0012	5.95	7.23	.4786	-.0034	-.0075	.0019
8.01	7.36	.5697	-.0020	-.0064	.0013	7.98	7.18	.6058	-.0027	-.0075	.0021
9.99	7.25	.6278	-.0021	-.0043	.0016	9.95	7.21	.6838	-.0023	-.0036	.0013
11.98	7.16	.7428	-.0021	-.0034	.0017	11.94	7.05	.7422	-.0030	-.0025	.0014
13.05	7.06	.7920	-.0015	-.0037	.0016	13.15	6.93	.7880	-.0023	-.0035	.0021
17.02	6.96	.9036	.0002	-.0015	.0001	17.31	6.77	.9495	-.0002	-.0010	.0005
19.01	6.90	.9073	-.0009	-.0013	.0007	19.28	6.74	.9853	.0010	.0004	-.0009
20.97	6.86	.9499	-.0028	-.0017	-.0011	21.12	6.66	1.0076	-.0024	-.0006	-.0001
24.89	6.75	1.0365	-.0160	-.0036	.0046	25.07	6.55	1.1030	-.0184	-.0028	.0056
-0.03	14.74	.1224	-.0003	-.0179	.0003	-0.03	14.56	.1241	-.0008	-.0176	.0009
1.87	14.71	.2347	-.0018	-.0177	.0017	1.96	14.52	.2438	-.0020	-.0158	.0023
3.77	14.69	.3631	-.0031	-.0170	.0026	3.96	14.49	.3858	-.0033	-.0146	.0035
5.70	14.69	.4862	-.0043	-.0158	.0035	5.98	14.46	.5234	-.0044	-.0123	.0046
7.61	14.68	.5962	-.0049	-.0144	.0039	7.98	14.44	.6483	-.0044	-.0123	.0045
9.52	14.61	.6588	-.0047	-.0078	.0038	9.98	14.49	.7176	-.0039	-.0076	.0042
11.42	14.54	.7466	-.0048	-.0057	.0035	11.94	14.39	.7652	-.0066	-.0016	.0184

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(a) Inboard aileron - Continued

M = 0.94						M = 0.98					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-0.03	-14.43	-.1298	-.0016	.0139	.0019	-0.03	-14.31	-.1156	-.0022	.0137	.0023
1.87	-14.49	-.0051	.0007	.0163	.0007	1.87	-14.37	.0147	-.0001	.0169	.0014
5.70	-14.59	.2726	.0051	.0199	-.0019	3.77	-14.45	.1496	.0030	.0185	-.0004
7.61	-14.62	.4066	.0074	.0205	-.0034	5.70	-14.52	.2876	.0053	.0196	-.0017
9.52	-14.64	.5255	.0090	.0218	-.0044	7.61	-14.59	.4207	.0081	.0214	-.0033
11.42	-14.77	.5981	.0095	.0195	-.0053	9.52	-14.64	.5402	.0110	.0229	-.0052
13.07	-14.89	.6905	.0112	.0176	-.0064	11.42	-14.63	.6495	.0132	.0230	-.0067
15.22	-15.27	.7733	.0131	.0127	-.0065	13.09	-14.83	.7471	.0162	.0234	-.0092
17.27	-15.50	.8680	.0157	.0117	-.0093	15.24	-14.98	.8537	.0214	.0226	-.0123
19.36	-15.64	.9472	.0165	.0094	-.0098	17.35	-15.31	.9429	.0255	.0208	-.0152
21.38	-15.76	1.0000	.0133	.0048	-.0096	19.40	-15.67	1.0172	.0264	.0140	-.0171
						21.48	-15.88	1.0867	.0230	.0086	-.0169
-0.01	-7.23	-.0846	-.0006	.0084	.0006	-0.01	-7.13	-.0704	-.0013	.0078	.0009
1.89	-7.31	.0454	.0008	.0096	-.0000	1.89	-7.21	.0619	.0003	.0097	-.0000
3.79	-7.36	.1859	.0023	.0111	-.0008	3.79	-7.31	.1971	.0023	.0108	-.0009
5.72	-7.43	.3331	.0038	.0109	-.0016	5.72	-7.39	.3308	.0042	.0124	-.0015
7.63	-7.48	.4618	.0056	.0111	-.0028	7.63	-7.44	.4636	.0062	.0142	-.0028
9.54	-7.51	.5836	.0072	.0120	-.0036	9.54	-7.48	.5852	.0085	.0125	-.0042
11.45	-7.65	.6634	.0076	.0112	-.0041	11.45	-7.60	.6977	.0108	.0133	-.0057
13.13	-7.81	.7369	.0078	.0087	-.0042	13.15	-7.76	.7957	.0128	.0127	-.0074
15.22	-8.05	.8197	.0094	.0053	-.0043	15.28	-7.89	.9108	.0163	.0122	-.0097
17.29	-8.20	.9148	.0109	.0056	-.0059	17.39	-8.01	.9747	.0153	.0055	-.0093
19.32	-8.27	.9907	.0112	.0030	-.0074	19.42	-8.10	1.0777	.0176	.0054	-.0115
21.40	-8.16	1.0510	.0089	.0008	-.0054	21.51	-8.39	1.1367	.0184	.0034	-.0129
25.35	-8.25	1.1613	-.0063	-.0059	-.0003	25.43	-8.40	1.2570	-.0001	-.0028	-.0110
-1.36	0.04	-.1079	-.0006	-.0019	-.0003	-3.62	0.17	-.2470	.0004	-.0017	-.0002
0.37	0.00	.0109	-.0001	-.0008	-.0001	-1.60	0.08	-.1111	.0006	-.0010	.0001
1.42	-.03	.0896	-.0001	-.0002	-.0000	0.46	0.00	.0171	.0003	-.0005	.0001
2.40	-.06	.1600	-.0000	-.0000	-.0001	1.49	-.05	.0842	.0006	-.0006	.0001
4.36	-.14	.3086	.0006	.0016	-.0000	2.44	-.09	.1515	.0007	-.0002	.0003
6.40	-.21	.4588	.0009	.0015	-.0002	6.45	-.26	.4424	.0010	.0013	.0004
8.33	-.25	.5809	.0016	.0037	-.0005	8.44	-.33	.5738	.0014	.0004	.0002
10.43	-.20	.6980	.0015	.0029	-.0010	10.45	-.40	.6987	.0020	.0002	.0002
11.56	-.24	.7393	.0019	.0015	-.0004	11.57	-.45	.7876	.0033	.0040	-.0015
12.45	-.28	.7539	.0012	.0014	-.0005	12.48	-.51	.8165	.0020	.0004	-.0002
13.69	-.51	.7994	.0025	.0019	-.0010	13.73	-.60	.9043	.0042	.0043	-.0021
15.84	-.61	.9057	.0019	.0011	-.0012	20.19	-.93	1.1412	-.0004	.0001	-.0013
17.98	-.76	.9952	.0017	.0012	-.0015	22.31	-1.03	1.2037	-.0017	.0004	-.0036
20.11	-.87	1.0732	.0002	.0006	-.0017	24.42	-1.15	1.2608	-.0129	-.0011	-.0022
22.20	-.97	1.1197	-.0060	-.0013	-.0002	26.54	-1.27	1.3132	-.0183	.0015	-.0021
24.28	-.96	1.1657	-.0175	-.0038	.0035						
26.40	-1.13	1.2220	-.0218	-.0050	.0060						
-0.12	7.26	.0558	-.0009	-.0110	.0005	-0.12	7.17	.0431	-.0009	-.0107	.0007
1.89	7.21	.1843	-.0016	-.0095	.0012	1.89	7.13	.1804	-.0018	-.0081	.0017
3.90	7.14	.3288	-.0024	-.0071	.0021	3.90	7.06	.3164	-.0024	-.0058	.0022
5.91	7.09	.4778	-.0030	-.0069	.0020	5.91	6.98	.4620	-.0028	-.0055	.0024
7.93	7.10	.6052	-.0021	-.0061	.0023	7.93	6.94	.5964	-.0026	-.0051	.0022
9.91	7.11	.7113	-.0019	-.0037	.0019	9.91	6.94	.7228	-.0027	-.0060	.0020
11.90	7.14	.7848	-.0025	-.0051	.0024	11.90	6.87	.8343	-.0024	-.0038	.0024
13.23	7.01	.8489	-.0023	-.0045	.0024	13.25	6.84	.9122	-.0023	-.0024	.0020
15.26	6.75	.9151	-.0015	-.0014	.0026	15.32	6.80	1.0108	-.0008	-.0002	.0016
17.35	6.66	1.0021	-.0005	-.0002	.0008	17.43	6.65	1.0989	.0005	.0009	.0013
19.42	6.61	1.0660	.0002	.0004	-.0008	19.52	6.53	1.1761	.0004	-.0003	-.0001
-0.05	14.42	.1207	-.0018	-.0176	.0022	-0.05	14.35	.1023	-.0021	-.0162	.0024
1.96	14.42	.2413	-.0030	-.0151	.0037	1.96	14.31	.2285	-.0035	-.0140	.0035
3.96	14.35	.3821	-.0043	-.0128	.0047	3.96	14.26	.3696	-.0045	-.0120	.0045
5.98	14.29	.5227	-.0049	-.0128	.0047	5.98	14.20	.5179	-.0055	-.0102	.0049
7.98	14.27	.6570	-.0053	-.0118	.0052	7.98	14.17	.6502	-.0060	-.0103	.0052
9.98	14.26	.7589	-.0049	-.0096	.0049	9.98	14.12	.7620	-.0065	-.0113	.0055
11.94	14.28	.8396	-.0051	-.0098	.0051	11.94	14.07	.8730	-.0060	-.0093	.0057

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(a) Inboard aileron - Concluded

M = 1.00						M = 1.03					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-0.03	-14.24	-.1111	-.0022	.0132	.0023	-0.03	-14.21	-.1044	-.0023	.0140	.0023
1.87	-14.30	.0139	-.0000	.0165	.0012	1.87	-14.28	.0311	.0004	.0160	.0010
3.77	-14.39	.1431	.0030	.0185	-.0003	3.77	-14.39	.1589	.0030	.0168	-.0005
5.70	-14.47	.2829	.0055	.0198	-.0016	5.70	-14.37	.3019	.0057	.0184	-.0019
7.61	-14.53	.4121	.0086	.0211	-.0033	7.61	-14.52	.4237	.0080	.0205	-.0033
9.52	-14.53	.5291	.0115	.0225	-.0050	9.52	-14.54	.5341	.0105	.0222	-.0052
11.42	-14.61	.6429	.0137	.0227	-.0072	11.42	-14.61	.6376	.0129	.0217	-.0071
0.30	-7.15	-.0424	-.0010	.0080	.0008	0.30	-7.13	-.0315	-.0005	.0075	.0006
2.31	-7.24	.0929	.0012	.0097	-.0001	2.31	-7.22	.1000	.0009	.0083	-.0000
4.32	-7.32	.2285	.0030	.0108	-.0010	4.32	-7.33	.2477	.0032	.0106	-.0010
6.33	-7.41	.3700	.0049	.0124	-.0020	6.33	-7.41	.3835	.0046	.0122	-.0019
8.34	-7.45	.5048	.0074	.0138	-.0035	8.34	-7.46	.5098	.0070	.0140	-.0034
10.33	-7.51	.6206	.0098	.0140	-.0051	10.33	-7.52	.6233	.0090	.0137	-.0050
12.33	-7.68	.7428	.0123	.0132	-.0068	12.33	-7.67	.7445	.0118	.0128	-.0066
-3.59	0.16	-.2398	.0002	-.0015	-.0002	-3.64	0.19	-.2523	.0002	-.0020	-.0002
-1.58	0.07	-.1120	.0001	-.0011	-.0000	-1.55	0.08	-.1082	.0000	-.0014	.0001
0.49	-0.00	.0176	.0005	-.0007	.0002	-0.54	0.04	-.0433	.0003	-.0007	.0001
1.49	-0.05	.0819	.0006	-.0006	.0001	1.52	-0.05	.0842	.0002	-.0006	.0002
2.50	-0.08	.1527	.0007	-.0000	.0003	2.50	-0.09	.1506	.0006	.0001	.0002
4.43	-0.18	.2866	.0010	.0006	.0004	4.49	-0.22	.2983	.0008	.0007	.0003
6.47	-0.27	.4257	.0013	.0009	.0004	6.44	-0.30	.4440	.0011	.0019	.0003
8.48	-0.35	.5646	.0018	.0017	.0002	8.47	-0.36	.5707	.0017	.0021	-.0000
10.46	-0.42	.6897	.0019	.0012	-.0003	10.46	-0.42	.6910	.0019	.0012	-.0001
12.31	-0.49	.7964	.0019	.0013	-.0005						
-0.12	7.16	.0396	-.0008	-.0107	.0008	-0.12	7.12	.0457	-.0009	-.0102	.0008
1.89	7.12	.1794	-.0018	-.0082	.0016	1.89	7.06	.1718	-.0019	-.0086	.0015
3.90	7.05	.3110	-.0025	-.0068	.0022	3.88	6.99	.3231	-.0024	-.0055	.0021
5.91	6.97	.4531	-.0022	-.0043	.0025	5.91	6.94	.4845	-.0028	-.0041	.0021
7.93	6.92	.5952	-.0023	-.0040	.0020	7.93	6.89	.6042	-.0027	-.0041	.0021
9.91	6.92	.7204	-.0029	-.0055	.0025	9.91	6.95	.7149	-.0026	-.0051	.0026
11.90	6.85	.8233	-.0030	-.0035	.0033	11.90	6.85	.8289	-.0026	-.0036	.0025
-0.03	14.34	.0964	-.0030	-.0164	.0025	-0.03	14.29	.0842	-.0021	-.0170	.0022
1.87	14.31	.2234	-.0043	-.0139	.0035	1.87	14.26	.2197	-.0038	-.0137	.0035
3.77	14.25	.3528	-.0054	-.0117	.0045	3.77	14.23	.3592	-.0046	-.0111	.0041
5.70	14.20	.4885	-.0065	-.0100	.0050	5.70	14.15	.4939	-.0056	-.0093	.0046
7.61	14.15	.6108	-.0068	-.0097	.0057	7.61	14.15	.6170	-.0062	-.0087	.0050
9.52	14.12	.7231	-.0073	-.0107	.0055	9.52	14.14	.7307	-.0067	-.0105	.0051
						11.42	14.08	.8265	-.0070	-.0100	.0052

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(b) Midspan aileron

M = 0.80						M = 0.90					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-1.90	-14.67	-.2055	-.0046	.0162	.0025	-1.92	-14.53	-.2081	-.0054	.0139	.0033
0.32	-14.70	-.0734	-.0034	.0167	.0019	0.33	-14.57	-.0712	-.0044	.0156	.0025
2.53	-14.73	.0547	-.0027	.0175	.0010	2.57	-14.62	.0705	-.0027	.0169	.0016
4.74	-14.79	.1979	-.0012	.0184	.0001	4.84	-14.67	.2294	-.0014	.0178	.0007
6.96	-14.81	.3467	.0005	.0187	-.0010	7.09	-14.71	.3924	.0001	.0194	-.0003
9.17	-14.88	.4817	.0015	.0174	-.0025	9.31	-14.87	.5240	.0019	.0187	-.0018
11.32	-15.09	.5878	.0030	.0141	-.0034	11.45	-15.09	.6029	.0028	.0145	-.0027
13.49	-15.21	.6999	.0044	.0134	-.0051	13.61	-15.26	.7169	.0050	.0133	-.0044
15.63	-15.26	.7920	.0065	.0122	-.0060	15.75	-15.34	.8149	.0078	.0131	-.0055
17.71	-15.35	.8492	.0066	.0096	-.0062	17.87	-15.40	.8846	.0075	.0114	-.0063
19.70	-15.37	.8660	.0030	.0050	-.0029	19.93	-15.47	.9203	.0032	.0072	-.0036
21.77	-15.43	.9085	-.0001	.0020	-.0007	21.98	-15.55	.9589	-.0007	.0025	.0001
23.86	-15.51	.9524	-.0090	-.0023	.0038	24.10	-15.65	1.0160	-.0107	-.0011	.0037
25.97	-15.65	1.0103	-.0089	-.0153	.0097	26.20	-15.82	1.0657	-.0190	-.0082	.0075
-1.86	-7.37	-.1654	-.0004	.0081	.0003	-1.91	-7.31	-.1817	-.0021	.0079	.0009
0.34	-7.41	-.0343	.0003	.0086	-.0001	0.34	-7.34	-.0397	-.0011	.0092	.0005
2.54	-7.43	.0954	.0012	.0090	-.0002	2.60	-7.39	.1107	-.0002	.0097	-.0001
4.76	-7.46	.2413	.0020	.0102	-.0007	4.86	-7.43	.2734	.0009	.0104	-.0005
6.98	-7.48	.3901	.0029	.0096	-.0014	7.12	-7.47	.4380	.0018	.0108	-.0013
9.18	-7.59	.5182	.0037	.0094	-.0018	9.34	-7.64	.5641	.0032	.0100	-.0021
11.36	-7.73	.6319	.0039	.0078	-.0026	11.47	-7.82	.6372	.0031	.0074	-.0026
13.49	-7.82	.7325	.0045	.0068	-.0034	13.62	-8.10	.7412	.0039	.0067	-.0034
15.64	-7.88	.8146	.0048	.0061	-.0039	15.77	-8.02	.8412	.0057	.0066	-.0039
17.72	-7.94	.8726	.0047	.0044	-.0041	17.88	-8.08	.9154	.0048	.0044	-.0038
19.72	-7.97	.8917	.0011	.0008	-.0005	19.94	-8.14	.9491	.0009	.0014	-.0014
21.77	-8.03	.9278	-.0028	-.0016	.0014	22.00	-8.23	.9850	-.0041	-.0027	.0032
23.87	-8.12	.9710	-.0136	-.0066	.0075	24.11	-8.32	1.0373	-.0135	-.0060	.0074
26.00	-8.23	1.0363	-.0109	-.0189	.0123	26.22	-8.34	1.0980	-.0208	-.0129	.0116
-3.65	0.03	-.2314	-.0006	-.0011	-.0006	11.48	-.43	.6780	.0014	.0014	-.0006
-1.56	0.01	-.1010	-.0005	-.0012	-.0004	13.64	-.54	.7841	.0017	.0012	-.0007
-0.58	0.00	-.0422	-.0001	-.0010	-.0003	15.77	-.60	.8707	.0020	.0013	-.0013
1.41	-.01	.0704	-.0002	-.0005	-.0004	17.89	-.65	.9373	.0004	.0001	-.0006
2.43	-.02	.1334	.0001	-.0005	-.0002	19.95	-.71	.9707	-.0015	-.0006	-.0002
4.47	-.03	.2678	.0001	.0007	-.0001	22.01	-.79	1.0089	-.0052	-.0032	.0028
6.44	-.05	.4029	.0003	.0010	.0001	24.13	-.95	1.0715	-.0158	-.0084	.0087
8.38	-.04	.5268	.0009	.0018	-.0004	26.23	-1.00	1.1238	-.0199	-.0113	.0121
10.45	-.11	.6167	.0009	.0014	-.0007						
11.39	-.31	.6732	.0012	.0013	-.0006						
12.50	-.16	.7238	.0007	.0011	-.0006						
13.53	-.41	.7674	.0015	.0008	-.0007						
15.65	-.46	.8405	.0012	.0011	-.0013						
17.72	-.47	.8929	.0004	.0005	-.0012						
19.72	-.48	.8983	-.0006	.0003	-.0014						
21.79	-.55	.9456	-.0063	-.0021	.0010						
23.88	-.50	.9937	-.0166	-.0065	.0073						
-1.81	7.41	-.0759	-.0013	-.0107	-.0005	-1.86	7.40	-.0894	-.0008	-.0116	-.0002
0.41	7.38	.0615	-.0006	-.0103	.0001	0.40	7.36	.0601	-.0014	-.0109	.0005
2.60	7.35	.1898	-.0006	-.0094	.0008	2.64	7.34	.2043	-.0016	-.0091	.0013
4.82	7.33	.3393	-.0011	-.0092	.0013	4.89	7.32	.3670	-.0015	-.0076	.0018
7.03	7.29	.4791	-.0006	-.0070	.0015	7.14	7.29	.5203	-.0011	-.0057	.0017
9.22	7.16	.5872	-.0008	-.0059	.0016	9.35	7.16	.6397	-.0016	-.0056	.0016
11.37	7.07	.6858	-.0005	-.0033	.0014	11.49	7.10	.6944	-.0018	-.0047	.0017
13.54	6.89	.7868	-.0013	-.0040	.0020	13.62	6.91	.7823	-.0017	-.0034	.0018
15.67	6.95	.8604	-.0005	-.0026	.0017	15.79	6.79	.8906	-.0008	-.0020	.0018
17.73	6.92	.9028	-.0015	-.0021	.0009	17.90	6.76	.9468	-.0006	-.0011	.0005
19.71	6.92	.9123	-.0031	-.0024	.0013	19.96	6.79	.9780	-.0024	-.0018	.0006
21.76	6.88	.9392	-.0083	-.0046	.0033	21.96	6.65	.9988	-.0086	-.0049	.0046
23.86	6.79	.9930	-.0215	-.0108	.0118	24.09	6.59	1.0532	-.0236	-.0114	.0145
25.98	6.71	1.0389	-.0215	-.0199	.0169	26.21	6.48	1.1097	-.0309	-.0162	.0175
-1.77	14.77	-.0300	-.0032	-.0197	.0012	-1.81	14.61	-.0427	-.0038	-.0193	.0017
0.43	14.71	.0987	-.0036	-.0187	.0021	0.41	14.56	.0932	-.0045	-.0175	.0029
2.62	14.69	.2334	-.0043	-.0174	.0033	2.66	14.54	.2405	-.0054	-.0161	.0040
4.85	14.70	.3832	-.0045	-.0171	.0040	4.92	14.53	.4093	-.0060	-.0151	.0046
7.06	14.68	.5216	-.0040	-.0144	.0042	7.16	14.55	.5653	-.0055	-.0130	.0047
9.25	14.61	.6235	-.0042	-.0122	.0044	9.36	14.48	.6778	-.0056	-.0132	.0052
11.39	14.49	.7082	-.0042	-.0075	.0043	11.50	14.34	.7168	-.0045	-.0077	.0046
13.53	14.42	.7976	-.0049	-.0076	.0050	13.63	14.20	.8079	-.0046	-.0056	.0044
15.64	14.38	.8626	-.0047	-.0055	.0043						

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(b) Midspan aileron - Continued

M = 0.94						M = 0.98					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-1.92	-14.43	-.2123	-.0058	.0131	.0036	-1.91	-14.28	-.2093	-.0065	.0116	.0039
0.34	-14.47	-.0659	-.0046	.0156	.0032	0.36	-14.33	-.0513	-.0050	.0156	.0034
2.61	-14.50	.0882	-.0031	.0165	.0021	2.63	-14.42	.1111	-.0030	.0166	.0021
4.	-14.59	.2722	-.0012	.0177	.0010	4.88	-14.53	.2773	-.0012	.0175	.0011
7.	-14.63	.4264	.0005	.0210	-.0000	7.11	-14.60	.4263	.0005	.0200	.0003
9.	-14.79	.5589	.0029	.0224	-.0020	9.36	-14.78	.5796	.0032	.0205	-.0022
11.	-14.98	.6481	.0035	.0179	-.0028	11.55	-14.97	.7035	.0061	.0220	-.0045
13.	-15.25	.7352	.0046	.0144	-.0040	13.72	-15.12	.8141	.0084	.0220	-.0064
15.	-15.39	.8441	.0079	.0135	-.0056	15.89	-15.31	.9288	.0122	.0224	-.0090
17.	-15.47	.9289	.0091	.0128	-.0070	18.04	-15.55	1.0144	.0147	.0188	-.0111
20.	-15.57	1.0031	.0086	.0117	-.0086	20.18	-15.67	1.0823	.0155	.0155	-.0122
22.	-15.64	1.0579	.0020	.0081	-.0069	22.29	-15.77	1.1405	.0092	.0131	-.0122
24.	-15.81	1.1186	-.0105	.0060	-.0045						
-1.93	-7.21	-.1946	-.0028	.0070	.0011	-1.89	-7.12	-.1736	-.0025	.0061	.0011
0.35	-7.25	-.0389	-.0015	.0088	.0007	0.37	-7.18	-.0221	-.0016	.0080	.0007
2.63	-7.32	.1243	-.0005	.0101	.0002	2.62	-7.28	.1315	-.0002	.0091	.0004
4.89	-7.39	.3014	.0009	.0109	-.0004	4.87	-7.37	.2968	.0010	.0104	-.0002
7.14	-7.48	.4621	.0021	.0121	-.0013	7.11	-7.47	.4515	.0019	.0128	-.0007
9.35	-7.62	.5948	.0037	.0124	-.0027	9.32	-7.66	.5954	.0043	.0135	-.0024
11.56	-7.76	.6915	.0039	.0098	-.0028	11.52	-7.84	.7266	.0062	.0133	-.0040
13.68	-7.97	.7632	.0042	.0075	-.0034	13.69	-8.00	.8424	.0079	.0128	-.0053
15.82	-8.04	.8734	.0063	.0068	-.0042	15.90	-8.06	.9722	.0101	.0130	-.0073
17.97	-8.21	.9595	.0071	.0065	-.0050	18.04	-8.24	1.0325	.0106	.0096	-.0073
20.09	-8.22	1.0331	.0060	.0058	-.0059	20.17	-8.41	1.0944	.0100	.0077	-.0085
22.17	-8.37	1.0851	-.0010	.0033	-.0046	22.30	-8.51	1.1622	.0047	.0064	-.0086
24.26	-8.46	1.1346	-.0144	.0006	-.0002	24.40	-8.58	1.2160	-.0094	.0050	-.0076
26.38	-8.56	1.1880	-.0320	-.0020	.0047	26.51	-8.65	1.2731	-.0256	.0072	-.0058
-1.36	0.01	-.1079	-.0006	-.0019	-.0003	-3.62	0.17	-.2470	.0004	-.0017	-.0002
0.37	0.00	.0109	-.0001	-.0008	-.0001	-1.60	0.09	-.1111	.0006	-.0010	.0001
1.42	-.01	.0896	-.0001	-.0002	-.0000	0.46	-.01	.0171	.0003	-.0005	.0001
2.40	-.03	.1600	-.0000	-.0000	-.0001	1.49	-.05	.0842	.0006	-.0006	.0001
4.36	-.06	.3086	.0006	.0016	-.0000	2.44	-.10	.1515	.0007	-.0002	.0003
6.40	-.16	.4588	.0009	.0015	-.0002	6.45	-.25	.4424	.0010	.0013	.0004
8.33	-.29	.5809	.0016	.0037	-.0005	8.44	-.86	.5738	.0014	.0004	.0002
10.43	-.32	.6980	.0015	.0029	-.0010	10.45	-.53	.6987	.0020	.0002	.0002
11.56	-.37	.7393	.0019	.0015	-.0004	11.57	-.61	.7876	.0033	.0040	-.0015
12.45	-.46	.7539	.0012	.0014	-.0005	12.48	-.69	.8165	.0020	.0004	-.0002
13.69	-.63	.7994	.0025	.0019	-.0010	13.73	-.81	.9043	.0042	.0043	-.0021
15.84	-.72	.9057	.0019	.0011	-.0012		-1.10				
17.98	-.82	.9952	.0017	.0012	-.0015	20.19	-1.14	1.1412	-.0004	.0001	-.0013
20.11	-.91	1.0732	.0002	.0006	-.0017	22.31	-1.21	1.2037	-.0017	.0004	-.0036
22.20	-.97	1.1197	-.0060	-.0013	-.0002	24.42	-1.30	1.2608	-.0129	-.0011	-.0022
24.28	-.98	1.1657	-.0175	-.0038	.0035	26.54		1.3132	-.0183	.0015	-.0021
26.40	-1.16	1.2220	-.0218	-.0050	.0060						
-1.87	7.33	-.0971	-.0009	-.0115	-.0000	-1.88	7.27	-.1100	-.0006	-.0108	.0001
0.40	7.25	.0566	-.0015	-.0106	.0010	0.37	7.14	.0395	-.0017	-.0095	.0010
2.65	7.24	.2136	-.0018	-.0082	.0016	2.62	7.09	.1953	-.0019	-.0076	.0016
4.90	7.18	.3796	-.0018	-.0069	.0018	4.89	7.04	.3646	-.0018	-.0056	.0021
7.14	7.14	.5328	-.0013	-.0054	.0018	7.11	6.98	.5191	-.0019	-.0048	.0019
9.36	7.04	.6677	-.0009	-.0042	.0017	9.33	6.85	.6628	-.0013	-.0038	.0017
11.54	6.94	.7767	-.0027	-.0085	.0032	11.52	6.71	.7906	-.0010	-.0031	.0017
13.70	6.95	.8378	-.0028	-.0064	.0028	13.73	6.52	.9309	-.0010	-.0027	.0018
15.84	6.58	.9231	-.0004	-.0020	.0015	18.06	6.39	1.0965	-.0022	-.0045	.0025
17.99	6.61	.9986	-.0001	-.0010	.0009	20.21	6.31	1.1608	-.0034	-.0037	.0022
20.11	6.55	1.0659	-.0015	-.0009	.0001						
-1.87	14.52	-.0660	-.0042	-.0194	.0023	-1.88	14.43	-.0837	-.0037	-.0188	.0025
0.41	14.47	.0944	-.0053	-.0172	.0033	0.39	14.33	.0739	-.0055	-.0170	.0037
2.67	14.46	.2461	-.0059	-.0148	.0045	2.65	14.29	.2387	-.0063	-.0137	.0048
4.92	14.39	.4182	-.0065	-.0132	.0051	4.88	14.24	.3909	-.0065	-.0114	.0053
7.15	14.36	.5659	-.0063	-.0123	.0052	7.14	14.22	.5555	-.0066	-.0118	.0055
9.38	14.24	.7046	-.0062	-.0117	.0053	9.33	14.14	.6854	-.0063	-.0102	.0053
11.57	14.18	.8087	-.0079	-.0147	.0071	11.53	14.01	.8205	-.0066	-.0089	.0058
						13.71	13.89	.9335	-.0069	-.0076	.0062

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(b) Midspan aileron - Concluded

M = 1.00						M = 1.03					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-1.90	-14.26	-.1965	-.0067	.0126	.0038	-1.92	-14.27	-.1998	-.0049	.0116	.0040
0.37	-14.31	-.0447	-.0052	.0149	.0033	0.37	-14.33	-.0388	-.0036	.0136	.0031
2.62	-14.41	.1056	-.0032	.0160	.0021	2.64	-14.41	.1180	-.0018	.0154	.0022
4.88	-14.53	.2686	-.0014	.0165	.0013	4.90	-14.55	.2847	.0003	.0161	.0012
7.13	-14.60	.4292	.0003	.0195	.0002	7.16	-14.62	.4424	.0017	.0190	.0005
9.34	-14.78	.5642	.0029	.0201	-.0018	9.38	-14.79	.5747	.0045	.0198	-.0019
11.55	-14.99	.7011	.0061	.0212	-.0042	11.58	-15.00	.6993	.0074	.0211	-.0044
13.71	-15.18	.8150	.0087	.0210	-.0063	13.74	-15.18	.8034	.0097	.0206	-.0062
-1.89	-7.08	-.1650	-.0028	.0062	.0013	-1.89	-7.07	-.1637	-.0008	.0056	.0013
0.36	-7.16	-.0220	-.0019	.0072	.0009	0.38	-7.16	-.0139	-.0001	.0066	.0009
2.62	-7.28	.1282	-.0005	.0086	.0005	2.64	-7.30	.1376	.0011	.0079	.0005
4.87	-7.36	.2892	.0005	.0101	-.0002	4.90	-7.40	.3036	.0024	.0100	-.0001
7.11	-7.45	.4439	.0012	.0125	-.0005	7.13	-7.42	.4616	.0031	.0134	-.0008
9.32	-7.63	.5859	.0038	.0137	-.0023	9.36	-7.66	.5902	.0054	.0134	-.0023
11.51	-7.86	.7139	.0057	.0130	-.0038	11.55	-7.89	.7194	.0072	.0127	-.0040
13.68	-8.02	.8340	.0076	.0128	-.0052	13.72	-8.04	.8244	.0088	.0122	-.0052
-3.59	0.17	-.2398	.0002	-.0015	-.0002	-3.64	0.19	-.2523	.0002	-.0020	-.0002
-1.58	0.07	-.1120	.0001	-.0011	-.0000	-1.55	0.09	-.1082	.0000	-.0014	.0001
0.49	0.00	.0176	.0005	-.0007	.0002	-0.54	0.04	-.0433	.0003	-.0007	.0001
1.49	-.05	.0819	.0006	-.0006	.0001	0.49	0.00	.0246	.0001	-.0005	.0001
2.50	-.10	.1527	.0007	-.0000	.0003	1.52	-.06	.0842	.0002	-.0006	.0002
4.43	-.18	.2866	.0010	.0006	.0004	2.50	-.11	.1506	.0006	.0001	.0002
6.47	-.26	.4257	.0013	.0009	.0004	4.49	-.23	.2983	.0008	.0007	.0003
8.48	-.36	.5646	.0018	.0017	.0002	6.44	-.28	.4440	.0011	.0019	.0003
10.46	-.56	.6897	.0019	.0012	-.0003	8.47	-.39	.5707	.0017	.0021	-.0000
12.31	-.69	.7964	.0019	.0013	-.0005	10.46	-.55	.6910	.0019	.0012	-.0001
-1.88	7.26	-.1103	-.0010	-.0103	.0002	-1.87	7.25	-.1084	-.0008	-.0093	.0002
0.37	7.16	.0387	-.0014	-.0093	.0007	0.38	7.13	.0383	-.0015	-.0083	.0008
2.62	7.11	.1880	-.0018	-.0075	.0013	2.63	7.06	.1881	-.0018	-.0067	.0013
4.88	7.06	.3558	-.0019	-.0054	.0018	4.91	7.01	.3742	-.0018	-.0050	.0017
7.12	7.01	.5110	-.0014	-.0043	.0021	7.15	6.95	.5261	-.0016	-.0033	.0018
9.34	6.88	.6533	-.0004	-.0034	.0017	9.37	6.85	.6618	-.0011	-.0032	.0014
11.52	6.75	.7799	-.0007	-.0025	.0014	11.56	6.73	.7801	-.0006	-.0026	.0012
-1.86	14.40	-.0773	-.0045	-.0181	.0023	-1.88	14.39	-.0883	-.0040	-.0167	.0023
0.39	14.31	.0680	-.0062	-.0165	.0036	0.39	14.26	.0670	-.0057	-.0155	.0035
2.64	14.22	.2222	-.0070	-.0135	.0047	2.64	14.23	.2204	-.0071	-.0138	.0045
4.89	14.23	.3866	-.0073	-.0112	.0054	4.91	14.19	.4000	-.0074	-.0104	.0050
7.13	14.20	.5413	-.0073	-.0105	.0053	7.15	14.17	.5530	-.0075	-.0089	.0051
9.35	14.13	.6862	-.0071	-.0098	.0052	9.38	14.08	.6921	-.0071	-.0091	.0051
11.55	13.98	.8173	-.0076	-.0087	.0055	11.57	13.97	.8082	-.0072	-.0080	.0054
13.71	13.87	.9263	-.0072	-.0068	.0057	13.72	13.84	.9089	-.0072	-.0064	.0055

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(c) Outboard aileron

M = 0.80						M = 0.90					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-0.01	-14.79	-.0558	-.0024	.0129	.0019	-0.01	-14.68	-.0494	-.0026	.0120	.0027
3.99	-14.84	.1924	-.0007	.0134	.0011	3.99	-14.76	.2238	-.0009	.0122	.0018
8.02	-15.02	.4604	.0021	.0126	-.0012	8.02	-14.99	.4957	.0024	.0128	-.0005
11.98	-15.14	.6645	.0031	.0102	-.0027	11.98	-15.05	.6630	.0026	.0104	-.0016
-0.03	-7.41	-.0350	-.0004	.0065	-.0000	-0.03	-7.37	-.0282	-.0005	.0062	.0005
3.98	-7.43	.2151	.0007	.0073	-.0003	3.98	-7.42	.2365	.0007	.0073	-.0000
7.99	-7.59	.4854	.0016	.0068	-.0012	7.99	-7.59	.5208	.0025	.0071	-.0015
11.96	-7.69	.6786	.0026	.0058	-.0027	11.96	-7.71	.6852	.0027	.0066	-.0019
13.05	-7.70	.7452	.0030	.0046	-.0024	13.20	-7.73	.7414	.0034	.0050	-.0017
17.14	-7.70	.8689	.0025	.0047	-.0034	17.28	-7.77	.9055	.0029	.0045	-.0025
21.04	-7.72	.9187	.0014	.0043	-.0046	21.27	-7.86	.9798	.0006	.0029	-.0017
24.94	-7.80	1.0144	-.0173	.0004	.0025	25.28	-8.03	1.1101	-.0139	-.0037	.0054
-3.65	0.02	-.2314	-.0006	-.0011	-.0006	11.48	-.38	.6780	.0014	.0014	-.0006
-1.56	0.01	-.1010	-.0005	-.0012	-.0004	13.64	-.43	.7841	.0017	.0012	-.0007
-0.58	0.00	-.0422	-.0001	-.0010	-.0003	15.77	-.46	.8707	.0020	.0013	-.0013
1.41	0.00	.0704	-.0002	-.0005	-.0004	17.89	-.50	.9373	.0004	.0001	-.0006
2.43	-.01	.1334	.0001	-.0005	-.0002	19.95	-.58	.9707	-.0015	-.0006	-.0002
4.47	-.02	.2678	.0001	.0007	-.0001	22.01	-.67	1.0089	-.0052	-.0032	.0028
6.44	-.12	.4029	.0003	.0010	.0001	24.13	-.77	1.0715	-.0158	-.0084	.0087
8.38	-.12	.5268	.0009	.0018	-.0004	26.23	-.88	1.1238	-.0199	-.0113	.0121
10.45	-.11	.6167	.0009	.0014	-.0007						
11.39	-.30	.6732	.0012	.0013	-.0006						
12.50	-.11	.7238	.0007	.0011	-.0006						
13.53	-.32	.7674	.0015	.0008	-.0007						
15.65	-.33	.8405	.0012	.0011	-.0013						
17.72	-.34	.8929	.0004	.0005	-.0012						
19.72	-.37	.8983	-.0006	.0003	-.0014						
21.79	-.44	.9456	-.0063	-.0021	.0010						
23.88	-.50	.9937	-.0166	-.0065	.0073						
-0.03	7.41	.0200	-.0014	-.0088	-.0004	-0.01	7.38	.0182	-.0010	-.0087	.0004
3.98	7.39	.2725	-.0010	-.0068	.0006	3.99	7.37	.2856	-.0008	-.0064	.0009
7.99	7.27	.5293	-.0017	-.0046	.0011	8.02	7.27	.5424	-.0003	-.0048	.0008
11.96	7.18	.7111	-.0009	-.0027	.0012	11.98	7.12	.7073	-.0004	-.0029	.0013
13.10	7.19	.7710	-.0010	-.0042	.0011	13.20	7.08	.7665	-.0011	-.0041	.0011
15.16	7.19	.8401	-.0008	-.0031	.0011	15.27	7.06	.8662	-.0005	-.0026	.0007
17.12	7.17	.9042	-.0013	-.0039	.0012	17.30	7.04	.9406	-.0014	-.0032	.0009
21.00	7.13	.9439	-.0028	-.0013	-.0012	21.23	6.95	1.0088	-.0038	-.0038	.0034
24.96	7.04	1.0453	-.0175	-.0072	.0075	25.25	6.80	1.1251	-.0198	-.0098	.0113

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Continued

[Tail off]

(c) Outboard aileron - Continued

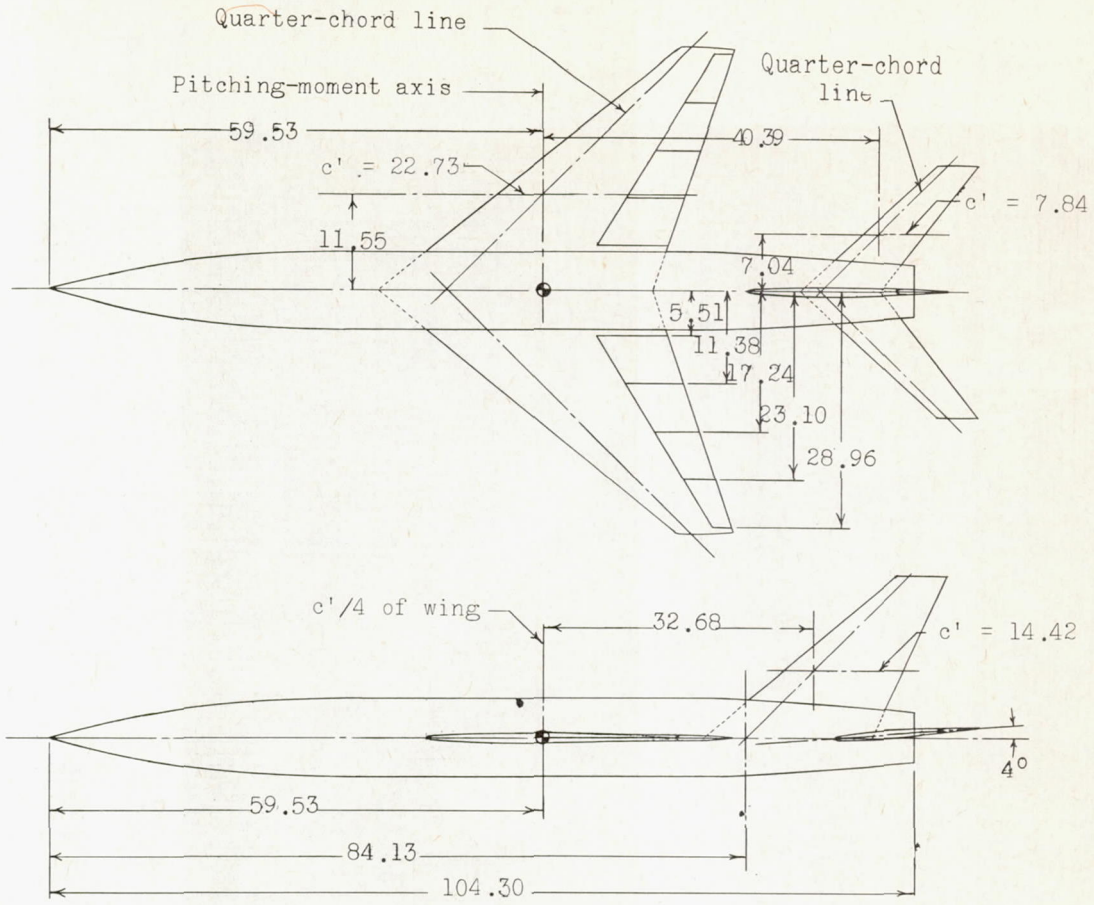
M = 0.94						M = 0.98					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-0.01	-14.61	-.0460	-.0028	.0110	.0028	-0.01	-14.45	-.0389	-.0034	.0098	.0031
3.99	-14.70	.2442	-.0009	.0125	.0020	3.99	-14.62	.2521	-.0007	.0115	.0021
8.02	-14.91	.5258	.0026	.0126	-.0003	8.02	-14.89	.5348	.0023	.0126	.0003
11.98	-15.10	.7206	.0039	.0099	-.0017	11.98	-15.20	.7682	.0063	.0127	-.0030
-0.03	-7.33	-.0294	-.0005	.0063	.0007	-0.03	-7.21	-.0242	-.0008	.0047	.0008
3.98	-7.38	.2607	.0012	.0072	.0003	3.98	-7.32	.2574	.0011	.0067	.0004
7.99	-7.55	.5424	.0032	.0081	-.0011	7.99	-7.56	.5455	.0029	.0079	-.0009
11.96	-7.76	.7187	.0039	.0072	-.0022	11.96	-7.93	.7814	.0062	.0094	-.0032
13.33	-7.83	.7972	.0044	.0054	-.0019	13.29	-7.98	.8607	.0066	.0094	-.0041
17.33	-7.91	.9591	.0038	.0052	-.0029	17.46	-8.08	1.0565	.0076	.0087	-.0060
21.38	-7.96	1.0841	-.0008	.0020	-.0020	21.52	-8.20	1.1886	.0019	.0025	-.0045
25.48	-8.12	1.1968	-.0174	-.0015	.0024						
-1.36	0.00	-.1079	-.0006	-.0019	-.0003	-3.62	0.12	-.2470	.0004	-.0017	-.0002
0.37	0.00	.0109	-.0001	-.0008	-.0001	-1.60	0.08	-.1111	.0006	-.0010	.0001
1.42	0.00	.0896	-.0001	-.0002	-.0000	0.46	0.01	.0171	.0003	-.0005	.0001
2.40	0.00	.1600	-.0000	-.0000	-.0001	1.49	-.03	.0842	.0006	-.0006	.0001
4.36	-.05	.3086	.0006	.0016	-.0000	2.44	-.06	.1515	.0007	-.0002	.0003
6.40	-.14	.4588	.0009	.0015	-.0002	6.45	-.23	.4424	.0010	.0013	.0004
8.33	-.36	.5809	.0016	.0037	-.0005	8.44	-.49	.5738	.0014	.0004	.0002
10.43	-.45	.6980	.0015	.0029	-.0010	10.45	-.66	.6987	.0020	.0002	.0002
11.56	-.50	.7393	.0019	.0015	-.0004	11.57	-.68	.7876	.0033	.0040	-.0015
12.45	-.54	.7539	.0012	.0014	-.0005	12.48	-.88	.8165	.0020	.0004	-.0002
13.69	-.56	.7994	.0025	.0019	-.0010	13.73	-.84	.9043	.0042	.0043	-.0021
15.84	-.60	.9057	.0019	.0011	-.0012	20.19	-1.01	1.1412	-.0004	.0001	-.0013
20.11	-.84	1.0732	.0002	.0006	-.0017	22.31	-1.05	1.2037	-.0017	.0004	-.0036
22.20	-.83	1.1197	-.0060	-.0013	-.0002	24.42	-1.10	1.2608	-.0129	-.0011	-.0022
24.28	-.92	1.1657	-.0175	-.0038	.0035	26.54	-1.18	1.3132	-.0183	.0015	-.0021
26.40	-1.03	1.2220	-.0218	-.0050	.0060						
-0.03	7.32	.0148	-.0014	-.0079	.0006	-0.01	7.19	.0075	-.0015	-.0074	.0008
3.98	7.34	.3051	-.0010	-.0059	.0012	3.99	7.16	.2788	-.0013	-.0038	.0015
7.99	7.20	.5814	-.0007	-.0045	.0006	8.02	7.09	.5667	-.0007	-.0026	.0011
11.96	7.05	.7490	-.0004	-.0023	.0011	11.98	6.89	.8029	-.0001	-.0021	.0009
13.27	6.99	.8080	-.0012	-.0033	.0013	13.31	6.77	.8797	-.0001	-.0007	.0003
15.31	6.91	.9054	-.0009	-.0022	.0009	15.39	6.78	.9845	.0008	.0001	-.0001
17.35	6.92	.9758	.0000	-.0009	-.0000	17.44	6.69	1.0807	.0014	.0012	-.0008
21.48	6.80	1.1196	-.0061	-.0041	.0027	21.61	6.65	1.1962	-.0046	-.0013	.0011
25.39	6.70	1.2173	-.0220	-.0051	.0081						

TABLE I.- BASIC DATA FOR MODEL WITH AILERONS ON RIGHT WING - Concluded

[Tail off]

(c) Outboard aileron - Concluded

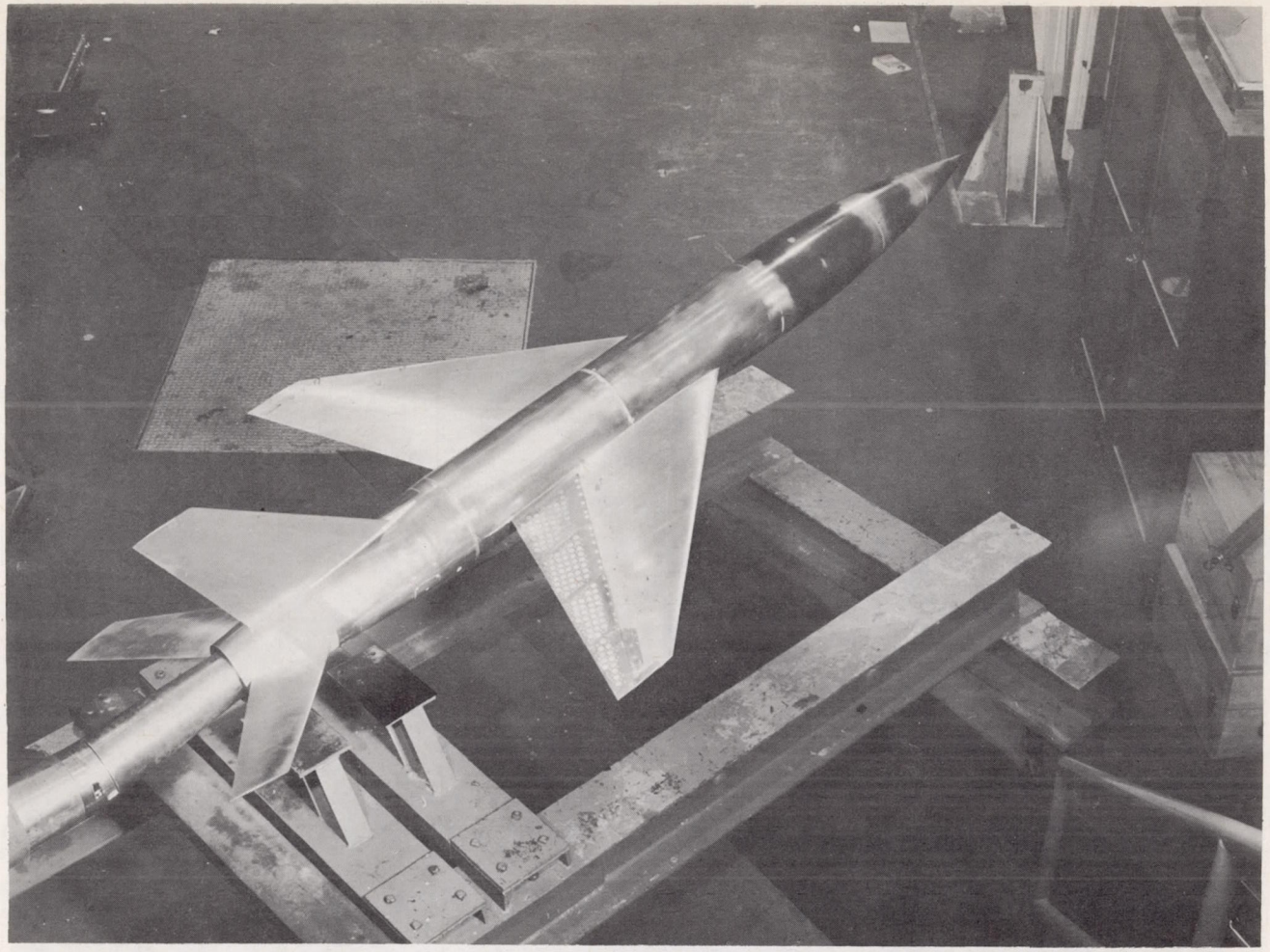
M = 1.00						M = 1.03					
α	δ	C_L	C_Y	C_l	C_n	α	δ	C_L	C_Y	C_l	C_n
-0.01	-14.43	-.0399	-.0035	.0095	.0031	-0.01	-14.38	-.0327	-.0041	.0091	.0031
3.99	-14.59	.2313	-.0008	.0111	.0022	3.99	-14.59	.2416	-.0015	.0112	.0019
8.02	-14.88	.5170	.0023	.0123	.0003	8.02	-14.88	.5316	.0016	.0133	.0004
11.98	-15.21	.7632	.0068	.0134	-.0030	11.98	-15.21	.7560	.0058	.0128	-.0031
-0.03	-7.15	-.0230	-.0012	.0044	.0009	-0.03	-7.14	-.0197	-.0016	.0044	.0009
3.98	-7.31	.2470	.0008	.0065	.0005	3.98	-7.32	.2548	.0005	.0067	.0004
7.99	-7.55	.5334	.0032	.0086	-.0008	7.99	-7.52	.5393	.0025	.0095	.0004
11.96	-7.95	.7688	.0058	.0090	-.0029	11.96	-7.93	.7653	.0069	.0052	-.0142
-1.58	0.07	-.1120	.0001	-.0011	-.0000	-3.64	0.15	-.2523	.0002	-.0020	-.0002
0.49	0.01	.0176	.0005	-.0007	.0002	-1.55	0.06	-.1082	.0000	-.0014	.0001
1.49	0.03	.0819	.0006	-.0006	.0001	-0.54	0.05	-.0433	.0003	-.0007	.0001
2.50	-.08	.1527	.0007	-.0000	.0003	1.52	-.04	.0842	.0002	-.0006	.0002
4.43	-.13	.2866	.0010	.0006	.0004	2.50	-.09	.1506	.0006	.0001	.0002
6.47	-.25	.4257	.0013	.0009	.0004	4.49	-.18	.2983	.0008	.0007	.0003
8.48	-.48	.5646	.0018	.0017	.0002	6.44	-.25	.4440	.0011	.0019	.0003
10.46	-.71	.6897	.0019	.0012	-.0003	8.47	-.51	.5707	.0017	.0021	-.0000
12.31	-.82	.7964	.0019	.0013	-.0005	10.46	-.70	.6910	.0019	.0012	-.0001
-0.03	7.17	.0116	-.0016	-.0067	.0009	-0.01	7.15	.0104	-.0018	-.0063	.0012
3.98	7.15	.2767	-.0011	-.0042	.0013	3.98	7.08	.2743	-.0017	-.0038	.0013
7.99	7.09	.5596	-.0006	-.0023	.0009	7.99	7.07	.5721	-.0011	-.0017	.0010
11.96	6.86	.7990	.0000	-.0015	.0008	11.96	6.84	.7897	-.0005	-.0015	.0005



	Wing	Horizontal tail	Vertical tail
Taper ratio	0.2	0.6	0.3
Aspect ratio	3.0	4.0	1.5
Area, sq ft	8.16	1.64	1.80
Airfoil section	NACA 65A004	NACA 65A006	NACA 65A005
Span	59.39	30.72	19.72
Root chord	33.00	9.60	20.22
Tip chord	6.60	5.76	6.06
$\Lambda_{c/4}$	45°	45°	45°

	Inboard	Midspan	Outboard
Aileron area, ft^2	.557	.430	.303
Moment of aileron area about roll axis, $in.^3$	882	1035	976

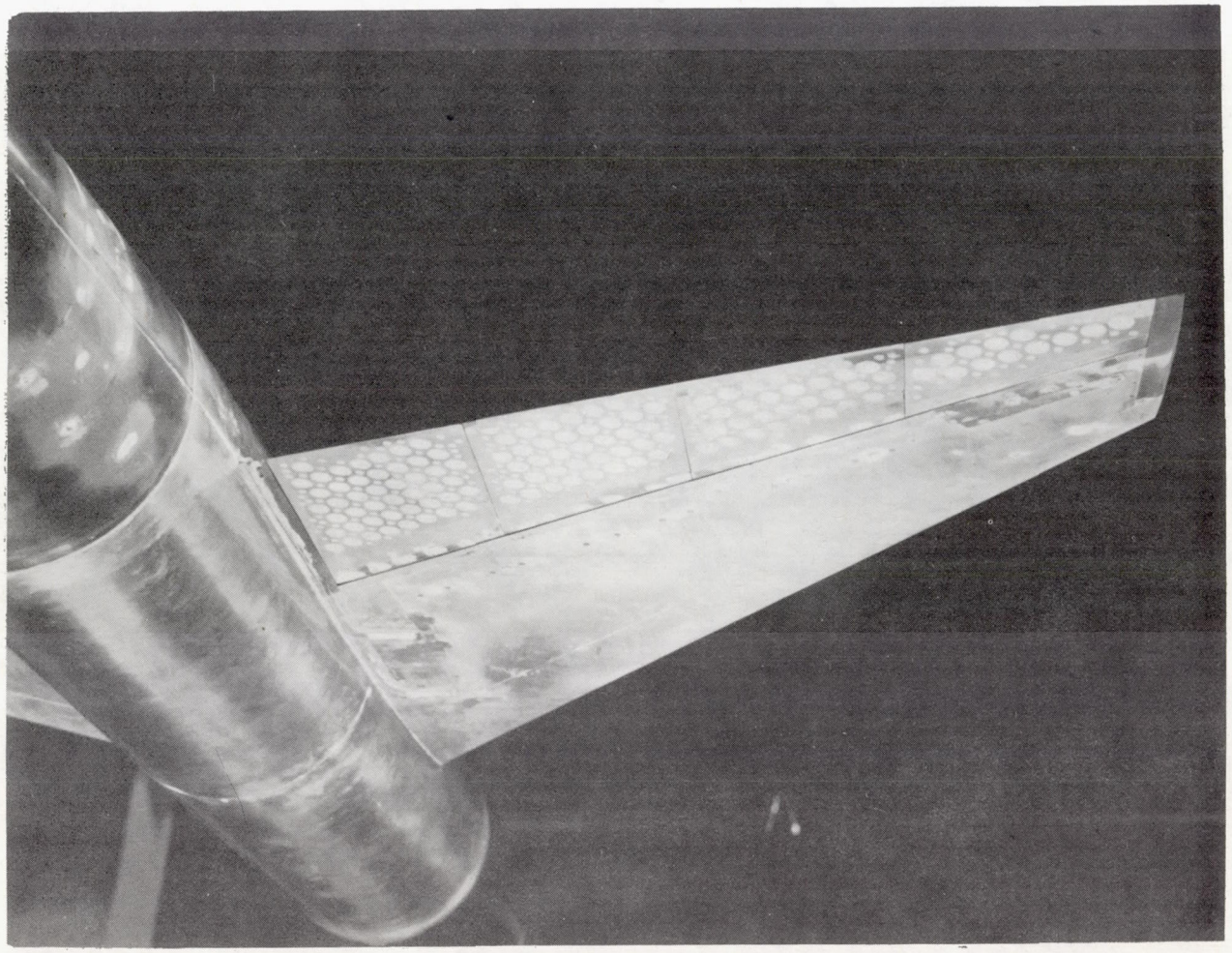
Figure 1.- Geometric details of model. All linear dimensions in inches.



L-89919.1

(a) Complete model.

Figure 2.- Photographs of model.



L-87670

(b) View of flaps on left wing.

Figure 2.- Concluded.

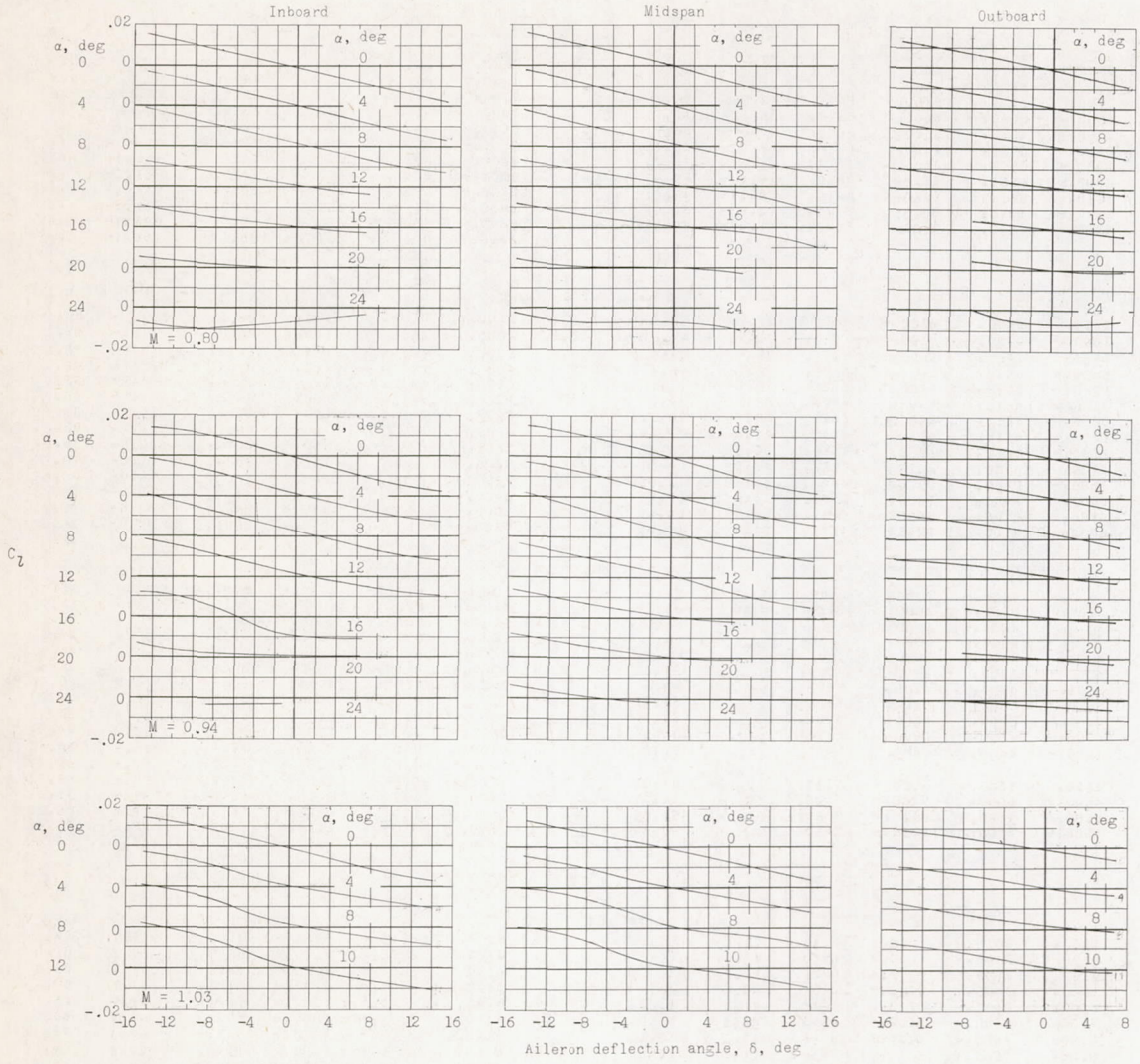


Figure 3.- Model rolling-moment characteristics for ailerons on right wing. Tail off.

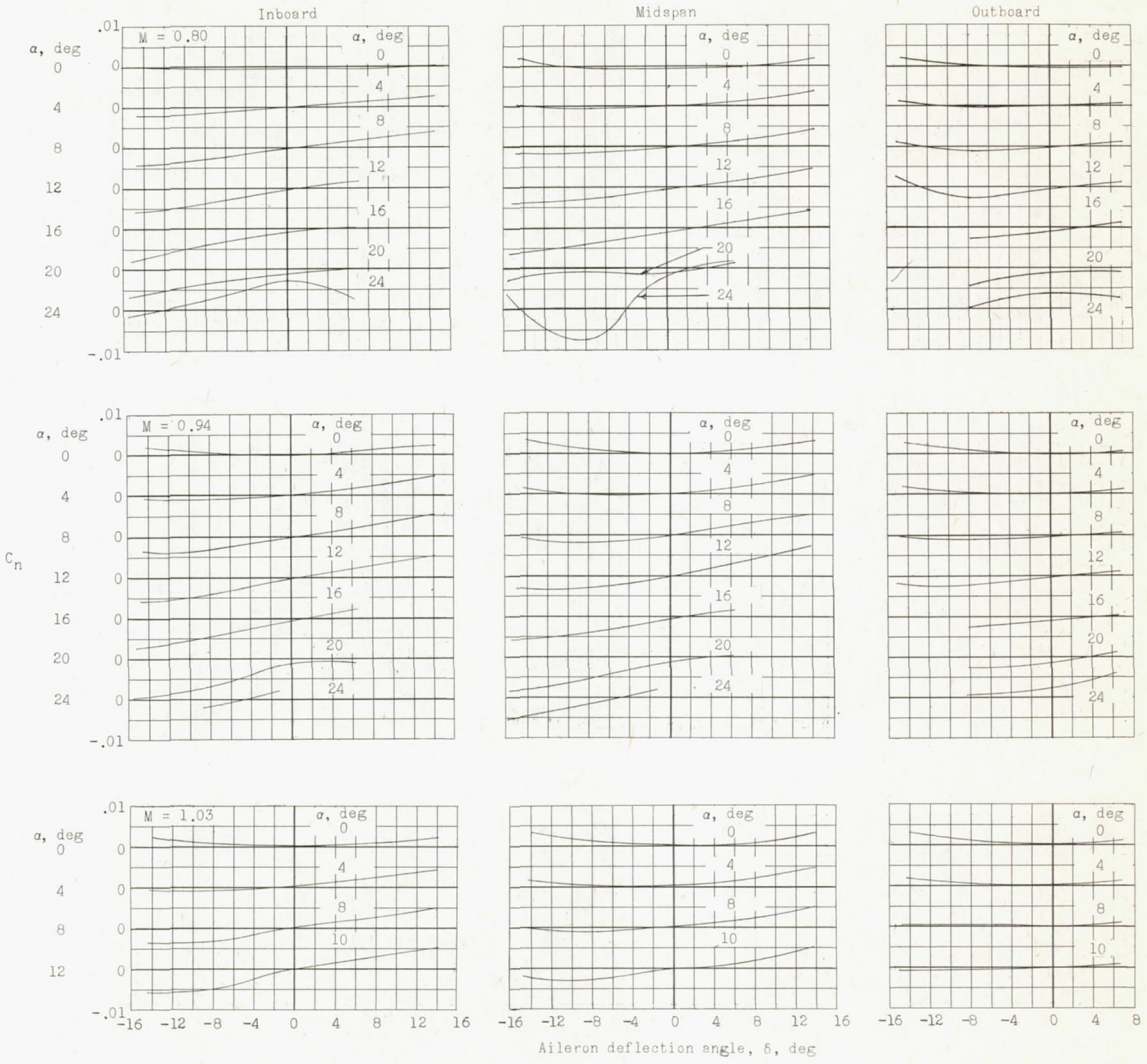


Figure 4.- Model yawing-moment characteristics for ailerons on right wing. Tail off.

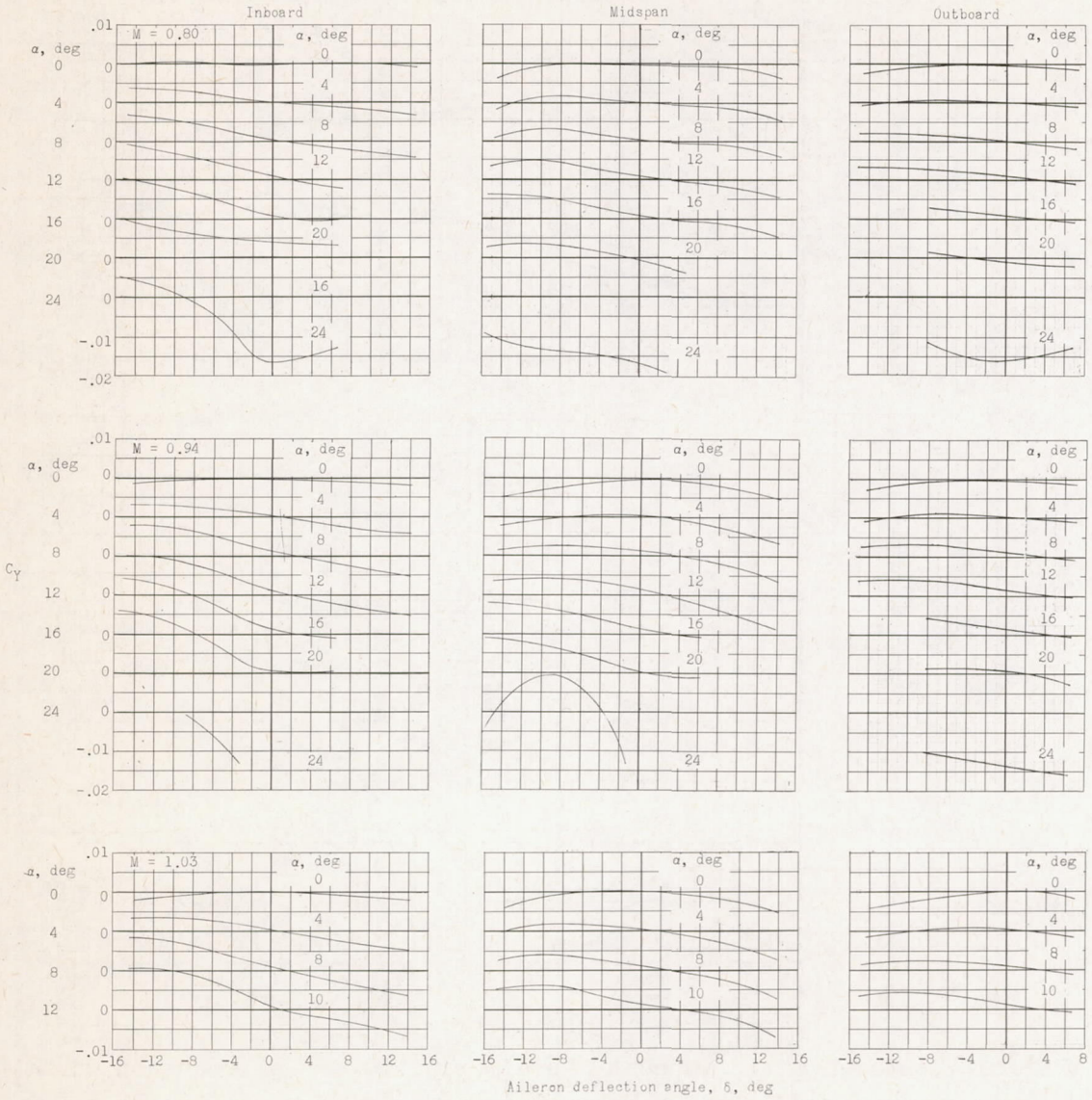


Figure 5.- Model lateral-force characteristics for ailerons on right wing. Tail off.

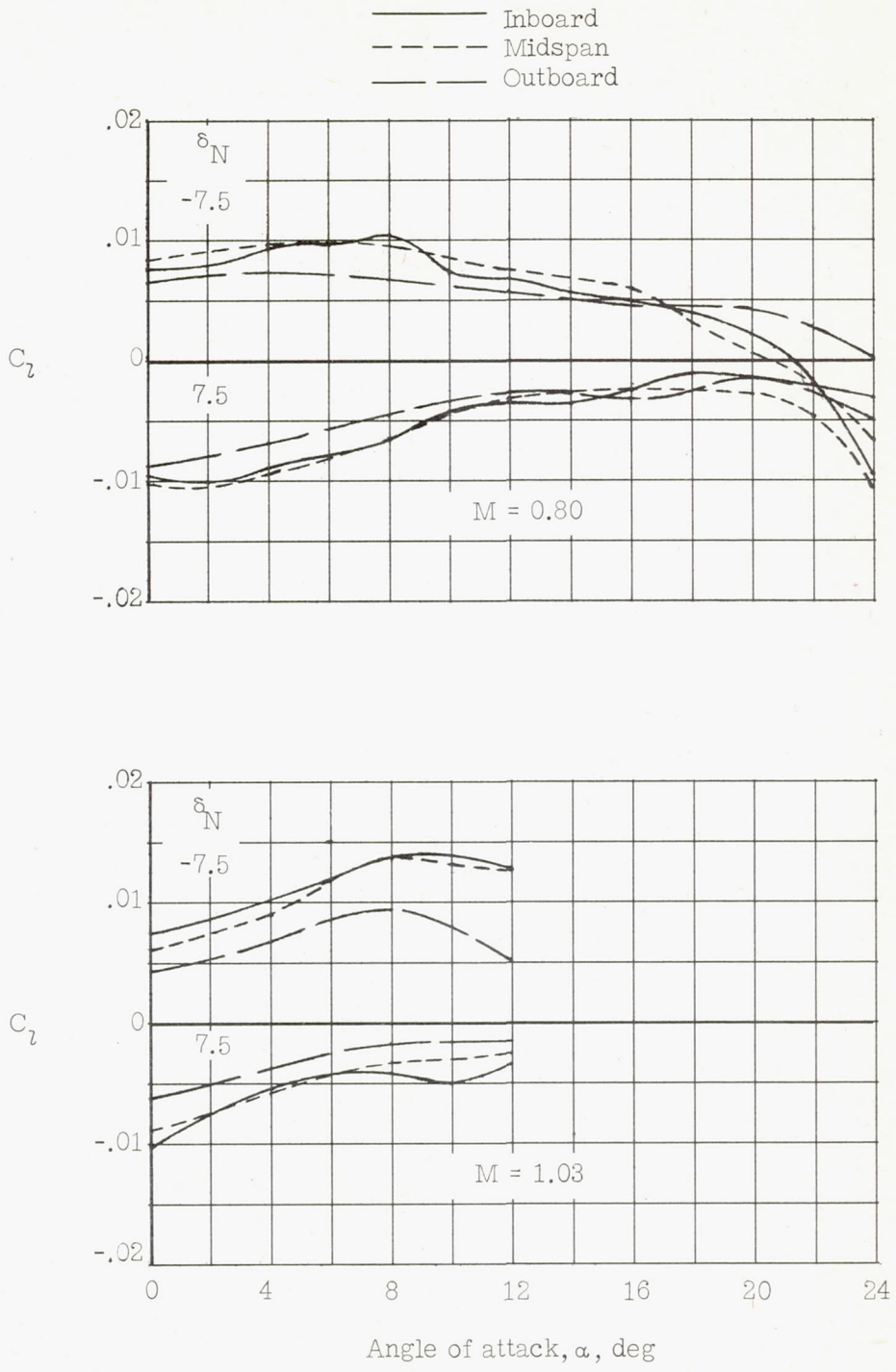
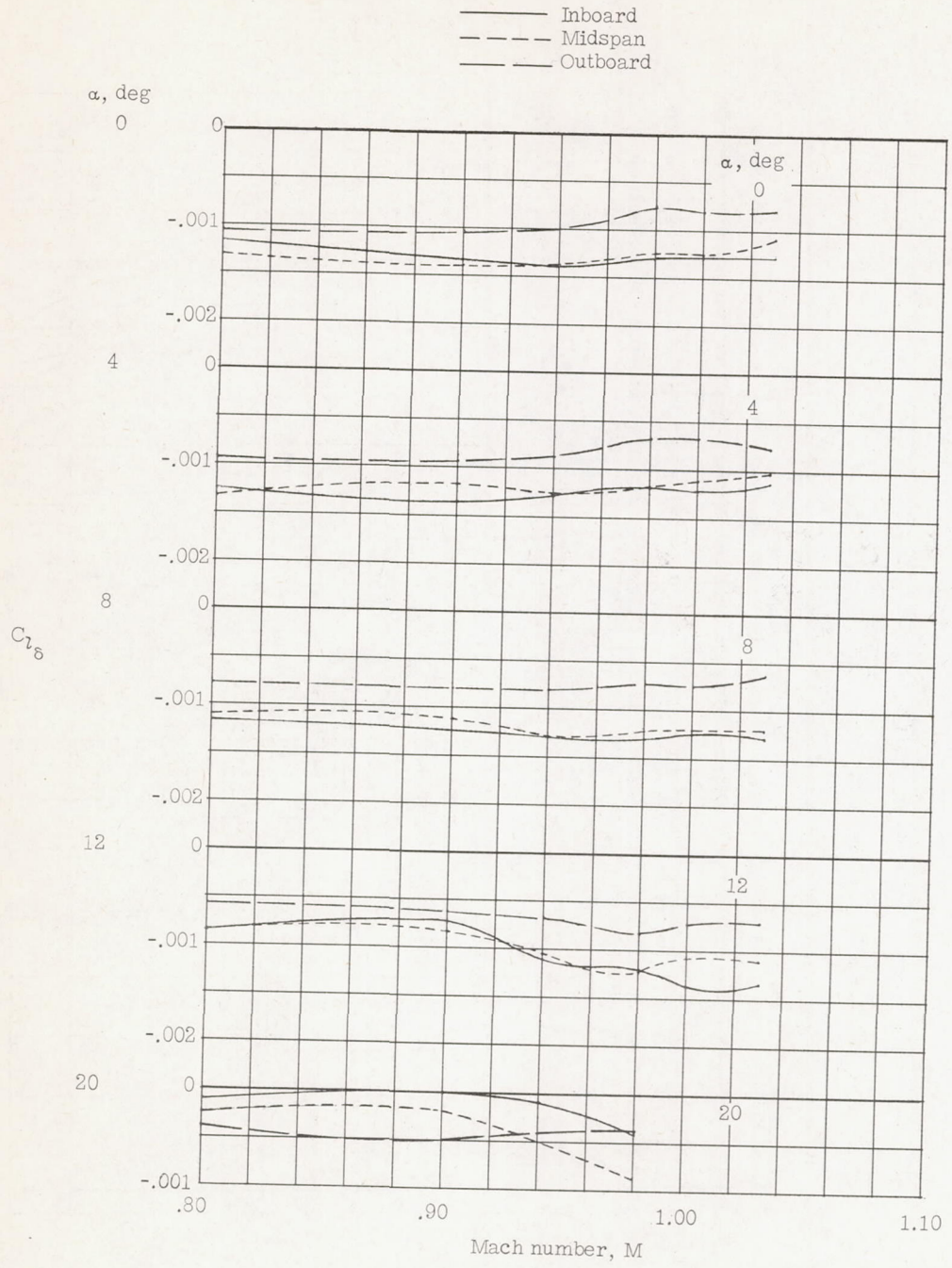
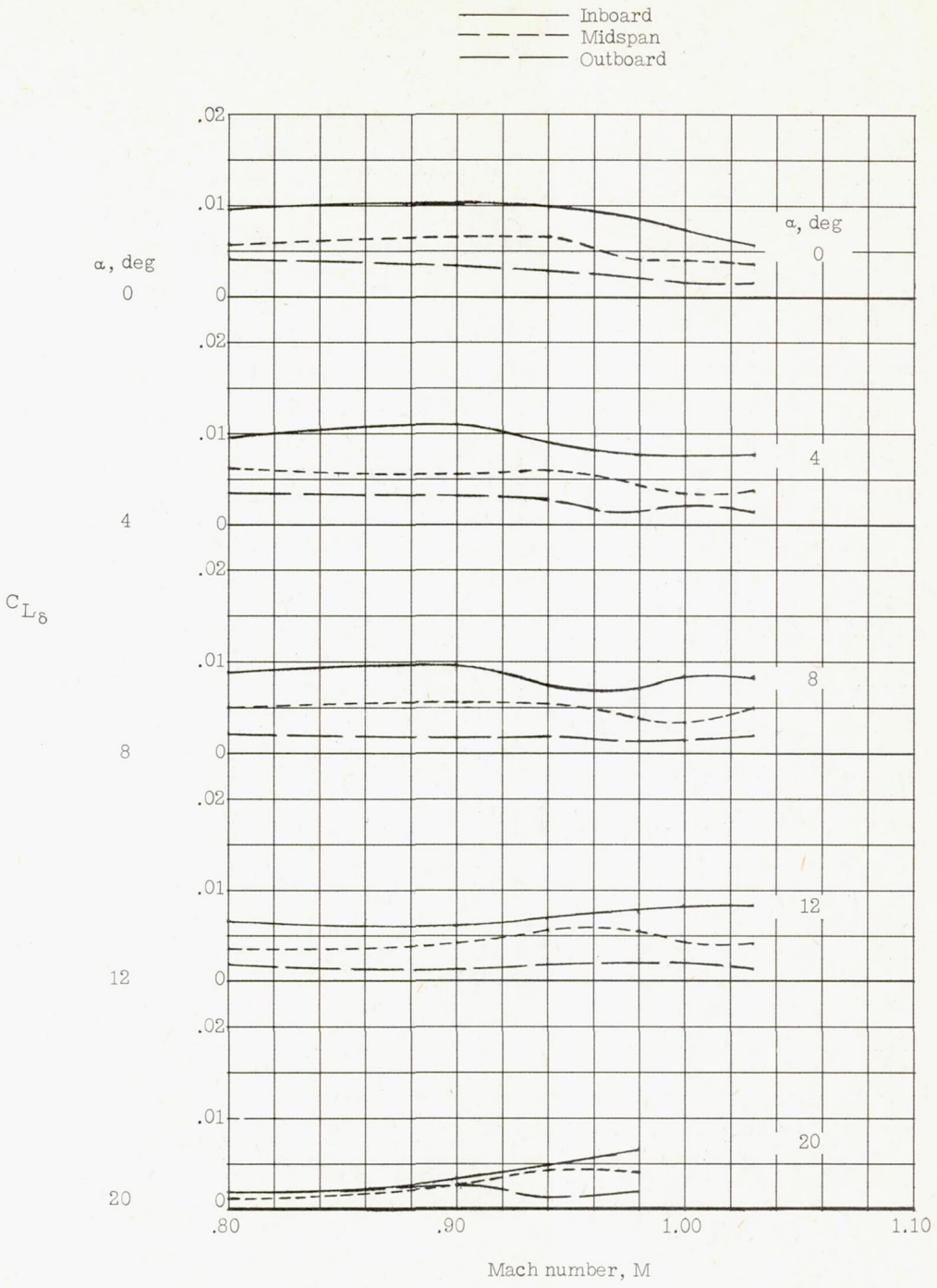


Figure 6.- Variation of rolling-moment coefficient with angle of attack. Ailerons on right wing; tail off.



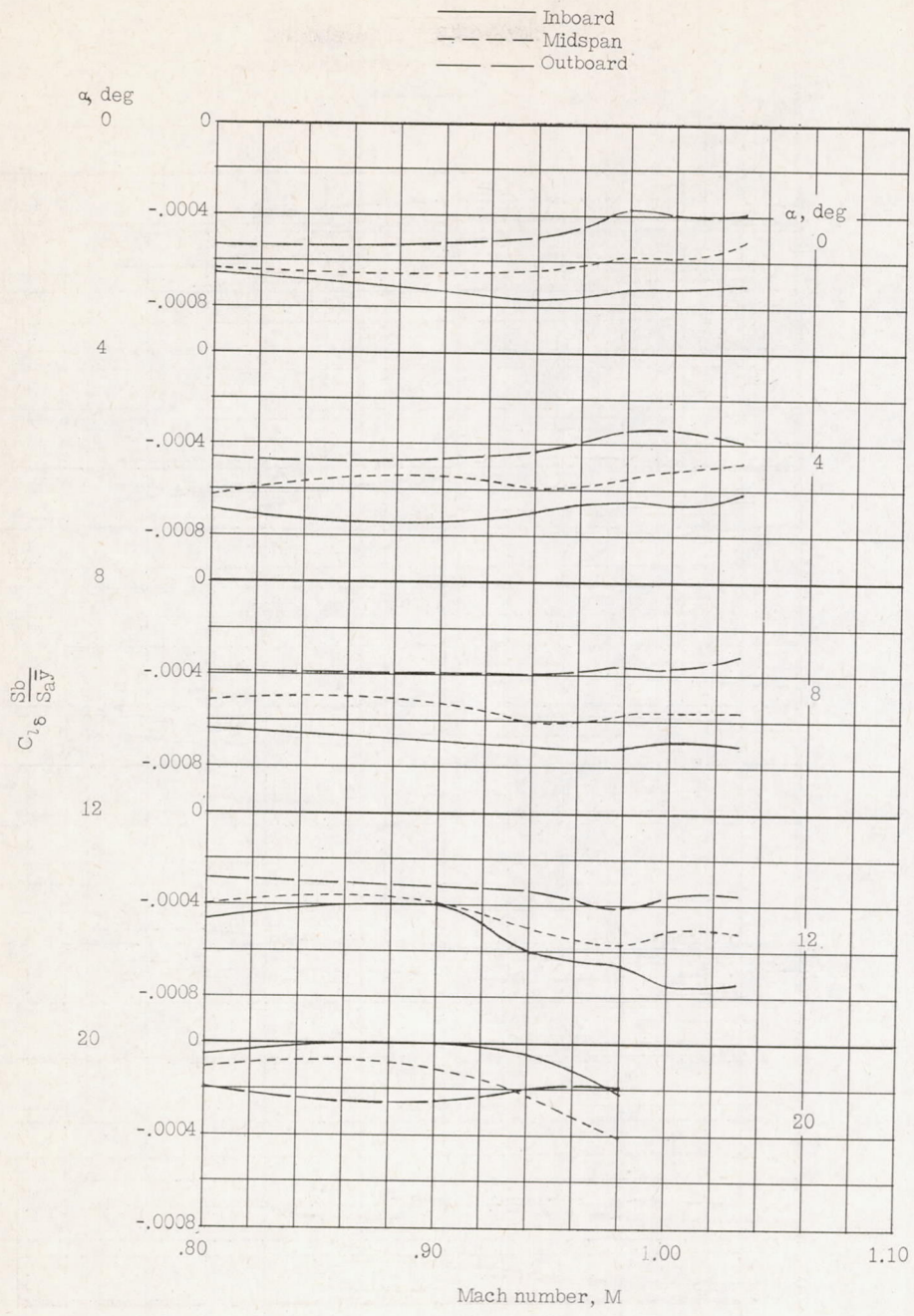
(a) C_{l_δ}.

Figure 7.- Effect of Mach number on the parameters C_{l_δ} and C_{L_δ}. Ailerons on right wing; tail off.



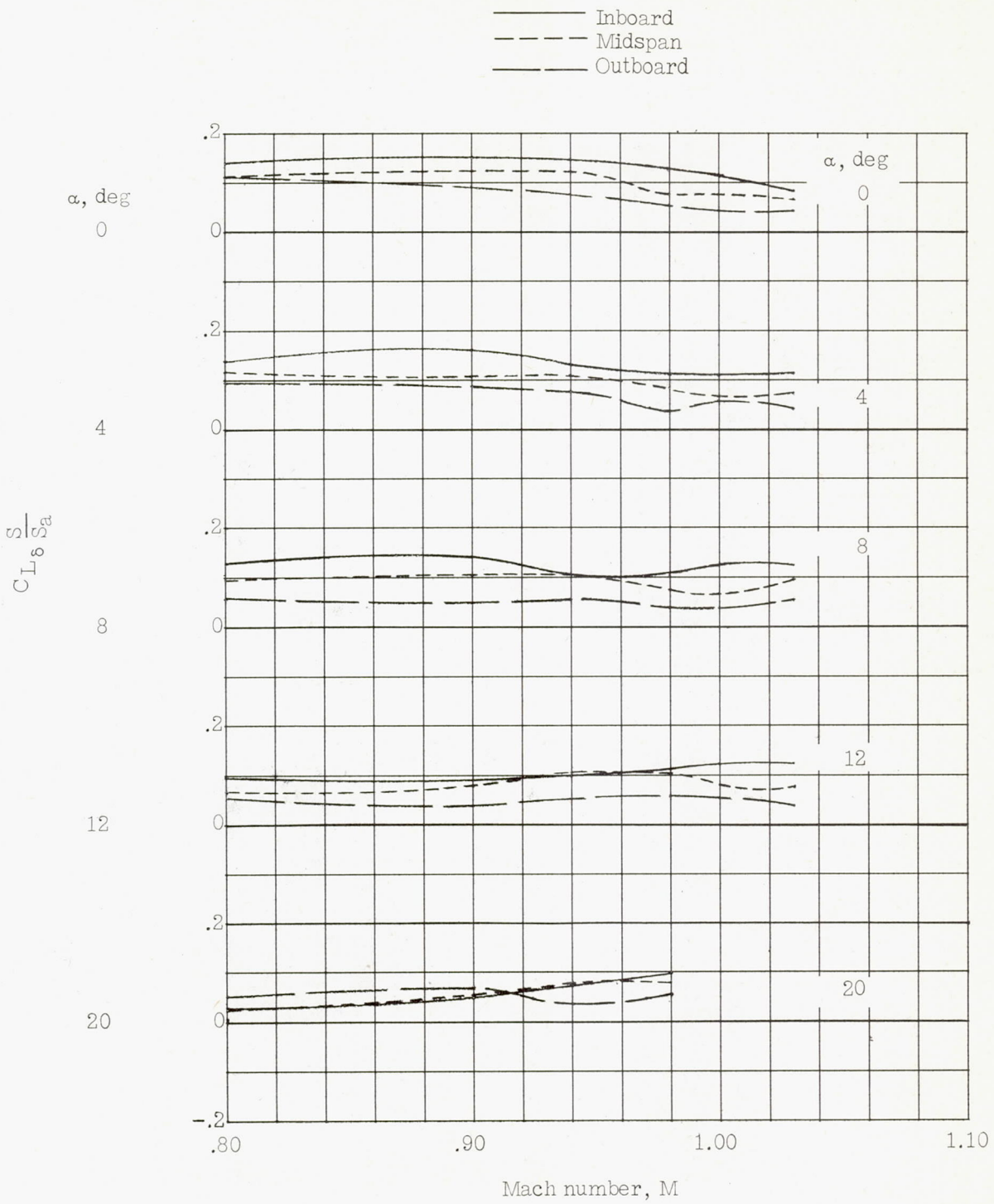
(b) C_{L_δ}.

Figure 7.- Concluded.



(a) $C_{l_\delta} \frac{Sb}{S_a \bar{y}}$.

Figure 8.- Effect of Mach number on the parameters $C_{l_\delta} \frac{Sb}{S_a \bar{y}}$ and $C_{L_\delta} \frac{S}{S_a}$. Ailerons on right wing; tail off.



(b) $C_{L_\delta} \frac{S}{S_a}$.

Figure 8.- Concluded.

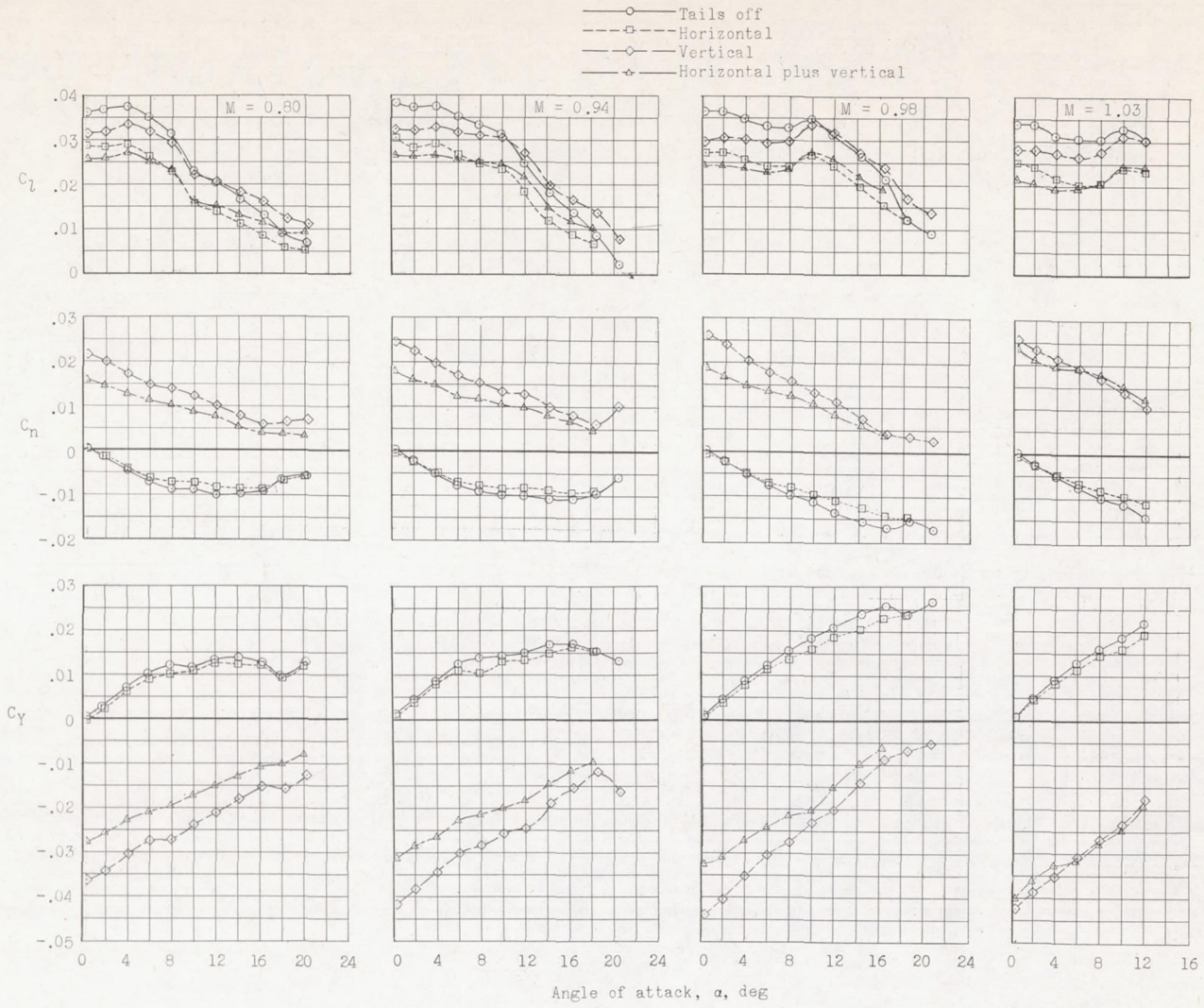


Figure 9.- Effect of tail on model lateral characteristics. Inboard ailerons differentially deflected 15°.

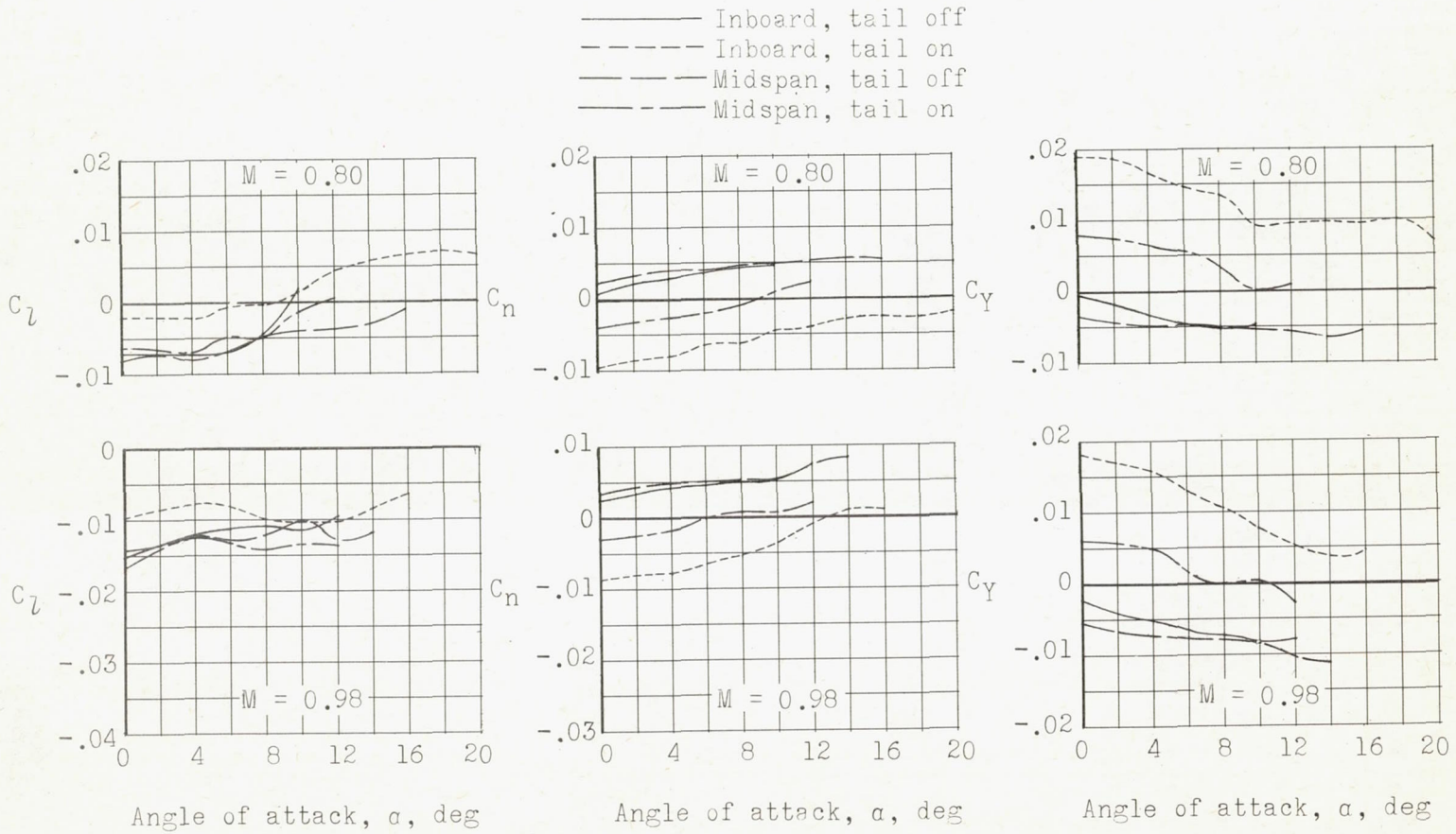


Figure 10.- Effect of tail on model lateral characteristics. Inboard and midspan ailerons on right wing; $\delta_N = 15^\circ$.